# MacWEEK

04.19.93 Volume 7 Number 16 THE NEWSWEEKLY FOR MACINTOSH MANAGERS


**4D Server**
MacWEEK benchmarks superior performance of ACI's client-server engine in a multi-user environment.

**DoveFax Pro+Voice**
Dove rolls fax, data and anwering-machine functions into one package.

In Reviews

See Page 47

## Apple polishing Unix for PowerPC and 680x0 Macs

**By Nathalie Welch**

San Francisco — Even as it races to port System 7 to the PowerPC and Intel platforms, Apple is expecting the Unix operating system to play an increasing role in its future — and not only on the Apple Workgroup Server 95.

An updated version of A/UX, offering better performance and compatibility with recent Mac models, should be released later this quarter. And PowerOpen, the new Unix implementation Apple and IBM Corp. are developing for the PowerPC platform, could open markets for Apple, company officials told corporate users attending this month's Apple Enterprise Computing Conference here.

▸ **A/UX.** The new release of Apple's 6-year-old Unix for 680x0-based Macs will add support for the Quadra 800 and Centris 650. It will also incorporate a series of enhancements developed for Version 3.0.1, the version that runs only on Apple's new high-end server. The improvements include better AppleTalk performance and support for asynchronous I/O and multiple SCSI buses, according to the company.

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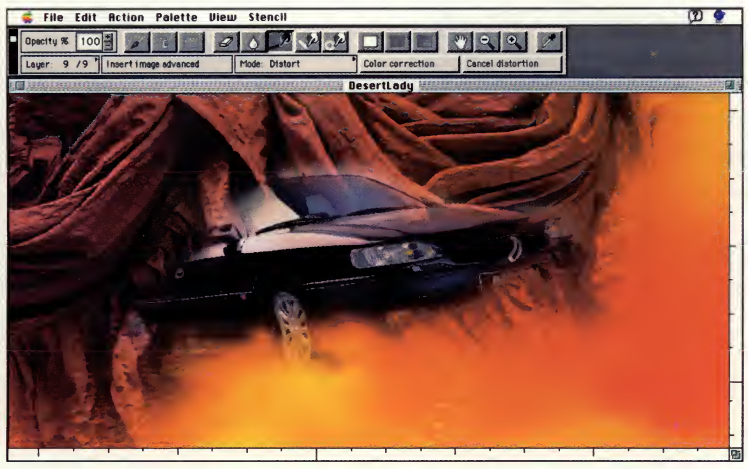


**Live Picture lets users quickly manipulate multiple high-resolution images. This 34-Mbyte image of a car was placed on the 72-Mbyte curtain in a few seconds using a Quadra.**

## Live Picture handles image edits in a snap

**By Neil McManus**

Boston — A small French company dazzled publishing professionals at Seybold Seminars 93 with a new Mac image-editing program that lets users perform complex manipulations on 100-Mbyte images in seconds.

Advanced Imaging S.A. last week previewed its Live Picture application and its breakthrough imaging technology. The Paris-based company will ship two French versions of Live Picture, priced at $5,000 and $12,000, next month. The company plans to release a U.S. version in June for between $3,000 and $5,000.

Live Picture brings better-than-workstation imaging performance to the Macintosh through a new technology the company calls a Functional Interpolating Transformation System, or FITS. FITS lets users rotate, scale, zoom and manipulate high-resolution tabloid-

*See Live Picture, Page 119*

**Special Report**

**Agent Technology**

***Someday you'll tell your software, "Do as I say, not as I do"***

See Page 41

## Apple set to sell apps on CD-ROM

*Prices could be below mail-order levels*

**By Henry Norr**

Cupertino, Calif. — Apple is apparently getting serious about a long-discussed plan to begin selling third-party software, as well as its own system software, utilities and networking products, on CD-ROM.

The company has begun briefing developers about the program, which it calls the Software Access Initiative. Under the plan, Apple would produce discs containing demonstration versions and promotional materials about selected third-party software, along with the full versions in encrypted form. The discs would be bundled with Apple's CD-ROM drives and possibly marketed at low cost through retail channels and the company's mail-order catalog.

Users could get access to the full versions by calling an Apple hot line and providing a credit card number in exchange for decryption codes. The company expects to charge prices for

*See CD-ROM, Page 120*

NEWSPAPER SECOND CLASS

## Apple site license makes quiet debut for big buyers

*System 7.1 out now; ARA is on the way*

**By Robert Hess and Leonard Heymann**

Cupertino, Calif. — Apple has quietly introduced its long-awaited site-licensing program, finally freeing volume buyers from drowning in system-software 10-packs.

Under the Apple Software Volume Licensing Program — unannounced but offered to a number of buyers at large Mac sites — users can purchase from resellers a license to duplicate System 7.1 and other selected Apple software, as well as buy support and maintenance programs to cover that software.

Apple declined to comment on the program except to say that it is in the pilot stage and still subject to change.

The program, active since mid-February, offers two types of software licenses:

▸ **Tiered Volume License.** Apple is offering licenses for 50 to 2,499 users, divided into six levels. The licensing covers nine products: System 7.1, Macintosh PC Exchange, At Ease, Apple Font Pack, DAL Client, MacTCP, MacX, SNA•ps 3270 and SNA•ps 3270 GC.

▸ **Master Software Site License.** Customers with 2,500 or more CPUs or who want complete site coverage for a single geographic site can negotiate a perpetual license with resellers and Apple. The same nine products are covered.

The Apple Software Maintenance Program, a new plan available only to

*See Site license, Page 119*

## Acrobat leads Seybold parade of electronic publishing apps

**By Neil McManus and Carolyn Said**

Boston — Paperless publishing, the new kid on the block, clamored for attention alongside more familiar desktop publishing issues such as type and color at Seybold Seminars 93 last week.

Companies lined up with solutions for creating and navigating electronic documents. But since no one's really given up printing, many attendees were happy to finally get their hands on Apple and Adobe Systems Inc.'s PostScript Level 2 drivers.

The four-day event drew about 10,000 attendees and more than 150 exhibitors. Products and issues included:

▸ **Electronic publishing.** Adobe is billing its Acrobat as a potential star player in this arena. Adobe said by June it will ship Mac and Windows versions of Acrobat Exchange, which will let users create files in

*See Seybold, Page 119*

CINDY LOO

**Seybold Seminars 93 last week drew about 10,000 attendees to hear about issues and products for publishing. Electronic document distribution, along with type and color, were dominant topics.**

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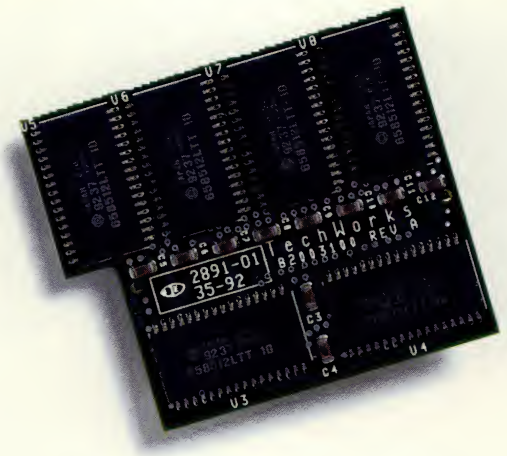


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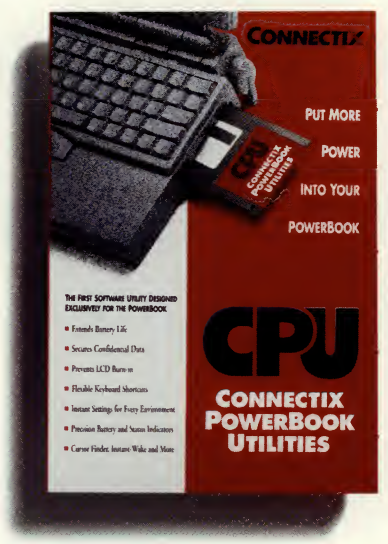


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## TECHWORKS™

# Developers move to block new Mac INIT-17 virus

**By Robert Hess**

San Francisco — Developers of Mac anti-virus utilities have moved quickly to respond to a new infection discovered this month.

Called INIT-17, the virus spreads to the System file and applications as they are run. According to experts who have analyzed the virus code, it contains several bugs that could cause crashes and damage. Some Macs, including the Plus, SE and Classic, may hang during application execution when the virus is present.

The virus, reportedly discovered in Canada, is programmed to present an alert reading "From the depths of Cyberspace" the first time an infected machine is started up after 6:06:06 p.m. on Oct. 31.

Developers of each of the major commercial anti-virus utilities last week posted information on on-line services and company bulletin boards enabling users to update their programs to combat INIT-17.

John Norstad, author of Disinfectant, updated his freeware program to Version 3.1. Version 1.2.7 of Chris Johnson's Gatekeeper utility already protects against the new virus. □

# Apple quarterly sales up, profits down

**By Jon Swartz**

Cupertino, Calif. — Apple last week reported a sharp increase in quarterly sales, but declining margins cut into its profits.

The company said sales for its second fiscal quarter ended March 26 rose 15 percent to $1.97 billion, compared with $1.72 billion in the same quarter last year.

Profits, however, slid 18 percent to $110.9 million from $135.1 million last year. Apple blamed dwindling margins, which it attributed to new product introductions and aggressive pricing actions. Gross margins were 38.5 percent, compared with 44 percent a year ago.

"[Apple's gross margins] are the lowest since I can remember," said John Girton, vice president of research at Van Kasper & Co., a San Francisco investment bank.

Girton said Apple's predominantly low-end product mix as well as pricing pressure from IBM PC and compatible industry competitors drove margins down.

Apple's ongoing business strategy of sacrificing margins for increased market share appears to be paying off, however. Apple CEO John Sculley, in a prepared statement, said Mac unit sales jumped 38 percent worldwide and 50 percent in the United States, compared with the same quarter last year. PowerBook unit sales, he said, increased 70 percent worldwide and 100 percent in the United States.

Domestic sales led the revenues surge, rising 23 percent over the same quarter last year, while European sales were flat, according to the company. Apple said it is now the second-largest personal computer company in Japan.

Girton predicted Apple's upcoming Workgroup Servers would help boost the company's sales worldwide during the second half of the year.

Apple announced its financial results after the stock market closed last Thursday. □

# Microsoft sales, profits up for Q3

Redmond, Wash. — Microsoft Corp. last week reported its usual healthy jump in sales and profits.

Sales for the company's third quarter ended March 31 rose to $958 million, a 41 percent increase compared with the same quarter last year. Earnings increased 36 percent to $243 million.

Microsoft reportedly cautioned financial analysts that it does not expect to be able to sustain its current 25 percent after-tax margins in the long run. "But that's not new," said Rick Sherlund, an analyst with Goldman, Sachs, an investment banking company in New York. "The company has been making that comment on margins for years."

Despite the stellar financial results, several Wall Street investment banks last week changed their recommendations on Microsoft stock from buy to hold. Money managers are concerned about pricing pressures in the software market and the Federal Trade Commission's investigation of Microsoft's business practices. The FTC staff has reportedly submitted a new report on the case to the commissioners. □

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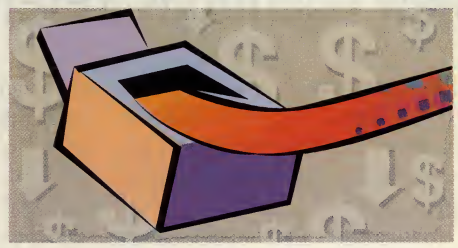

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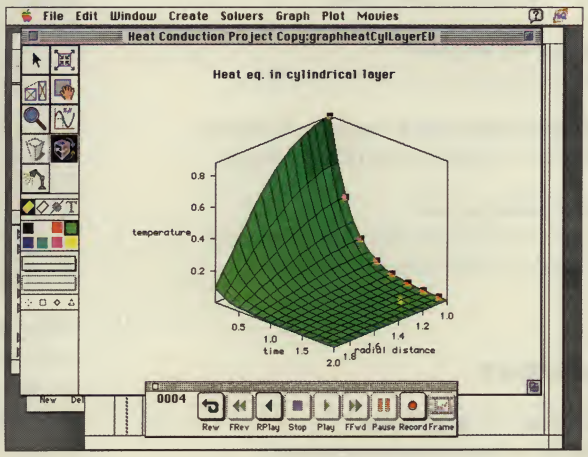
# HiQ update advances engineering

## *Bimillennium adds solvers, functions*




**Bimillennium's HiQ 2.0 can create animated movies from charts.**

**By Raines Cohen**

Los Gatos, Calif. — Bimillennium Corp. last week beefed up its HiQ integrated math program for the Mac with a number of new features and performance improvements.

The analysis package, announced in early 1991 and first shipped last year, uses a desktop metaphor to provide access to engineering, mathematical, simulation and graphing tools.

HiQ 2.0, the first major upgrade for the $995 package, includes several enhancements to the program:

▶ **Interface.** HiQ 2.0 has a reorganized menu bar, with symbol creation and solution-generation entries organized by function. A find command lets users search through project worksheets to locate symbols.

▶ **Scripting.** The new version includes a number of enhancements to the product's object-oriented programming language, HiQ-Script, plus a graphical function browser. Users can choose from the supplied library of more than 600 functions, including trigonometric, integral, Eigenvalue, business and graphical functions. New functions added to Version 2.0 include data import and export in a number of engineering formats.

Once a HiQ-Script script is compiled, it is represented by an icon users can simply double-click to activate or incorporate into other routines.

▶ **Solvers.** HiQ 2.0 includes new solvers that let users calculate or approximate derivatives and integrals. Bimillennium also added a function for performing partial derivative meshes.

▶ **Graphing.** The new version supports transparency in overlaid plots and arbitrary levels for contours. As before, data can be plotted in 2-D and 3-D.

Graphs can be animated into non-QuickTime movies that represent change over time or as parameters vary.

The program requires 5 Mbytes of RAM and a 68020 or higher CPU equipped with an FPU (floating-point unit).

The company said a future version will take advantage of System 7 features such as QuickTime, publish and subscribe, and scriptability through AppleScript.

Bimillennium Corp. is at 16795 Lark Ave., Suite 200, Los Gatos, Calif. 95030. Phone (408) 354-7511 or (800) 488-8662; fax (408) 354-4388. □

# Maxa sends out Alert! to warn users of possible software conflicts

## *Compares listings in database with files*

**By Robert Hess**

Glendale, Calif. — Maxa Corp. hopes to help eliminate conflicts, crashes and confusion with the release last week of its Alert! diagnostic package.

The $229 Alert! scans a user's disk, accumulating a list of installed software. It then compares each item on the list to a database of known problems and notifies the user when possible conflicts are found, ranking conflicts by their potential to cause problems.

It offers the user advice on how to handle the problem, and it even offers to fix some problems itself by rearranging the order in which system extensions load or changing memory allocations for applications.

Alert! also checks for logical errors, such as users running with 32-bit addressing turned on when they have less than 8 Mbytes of memory.

The program looks for a variety of problems, including system-extension conflicts, prerelease and outdated versions of programs, and applications that it knows either require or are incompatible with 32-bit addressing.

The database of conflicts used by Alert! contains about 3,000 entries, according to Maxa. The company said it will post free monthly updates to the database on on-line services.

Network administrators can install on networked Macintoshes the Alert! Network Responder, a background application, to scan their disks as though they were mounted locally.

Alert! comes with two Network Responders. Additional Responders are available in sets of 10 for $775; site licenses are also available.

Maxa last month updated Snooper, its hardware-diagnostic application (see MacWEEK, April 5).

Maxa Corp. is at 116 Maryland Ave., Suite 100, Glendale, Calif. 91206. Phone (818) 543-1300; fax (818) 543-0104. □

**Maxa's Alert! helps users diagnose and prevent problems related to software incompatibilities.**

# Mathematica revision adds up new equations, reference guide

**By Raines Cohen**

Champaign, Ill. — Wolfram Research Inc. this month shipped an update to its math-processing application.

Mathematica 2.2 includes more than 2,000 enhancements over previous versions, according to the company. The product's numerical, symbolic and graphical computation functions have been improved, along with the product's programming and Notebook interfaces. New features include additional linear algebra and differential equation capabilities, a new on-line reference guide, and an enhanced Notebook front end with a function browser.

The program, simultaneously updated in its Unix, Mac, Windows and MS-DOS versions, is widely used for scientific and mathematical computation.

Mathematica remains priced at $595 for the Mac version.

Enhancements include:

▶ **Numeric.** The new version can recognize sparse linear systems and solve them faster than before, according to the company. The program's equation-solving capabilities have been improved, adding more-complex handling of symbolic matrices.

▶ **Symbolic.** Mathematica 2.2 supports more-sophisticated treatment of singularities in definite integrals. Solutions of symbolic differential equations have also been enhanced.

▶ **Packages.** New modules have been added to the program to help users solve problems in the areas of spline fitting, variational methods, elliptic integrals and music.

A new graphics package lets Version 2.2 plot implicit functions of three variables and construct isosurfaces from 3-D data sets. Another package defines pointers and arrows for use in plotting vector fields. Existing graphics, statistics, numerical limits, and Fourier and Laplace transform packages have been enhanced.

Version 2.2 is compatible with most Mathematica programs and Notebooks written in Mathematica 2.0 or 2.1, according to the company.

Users subscribing to the company's Mathematica Plus update program will receive free upgrades. Others can upgrade for $50 or more, depending on configuration.

Wolfram Research Inc. is at 100 Trade Center Drive, Champaign, Ill. 61820-7237. Phone (217) 398-0700; fax (217) 398-0747. □

# Sony, HP announce 1.3-Gbyte optical drives

**By Henry Norr**

Palo Alto, Calif. — Sony Corp. and Hewlett-Packard Co., two longtime leaders in the field of optical storage, this month announced new drives and media that store up to 1.3 Gbytes of data on 5.25-inch cartridges.

▶ **Sony's new SMO-F521,** slated to ship in volume to OEM customers in the second half of the year, is a half-height mechanism, unlike most current 5.25-inch magneto-optical systems. The drive, which uses split optics, will offer an average access time of 40 milliseconds and a maximum sustained transfer rate of 2 Mbytes per second.

The drive can read and write industry-standard 650-Mbyte cartridges but will use a new type of magneto-optical cartridge to achieve its full capacity. The new format, based on a standard adopted by the European Computer Manufacturing Association, increases capacity mainly by storing more data on the longer outer tracks of the disk using a technique known as zoned constant angular velocity recording.

Pricing has not been set, but a spokeswoman said the new mechanism would be competitive with Sony's current 5.25-inch magneto-optical mechanism, which carries a manufacturer's suggested retail price of $3,995. The new disks will have a suggested retail price of $280, which adds up to a reduction in cost per megabyte from 31 cents to 22 cents, compared with current Sony media.

▶ **HP's Model C1716T,** a full-height drive slated for volume shipment in early summer, will use the same 1.3-Gbyte disk format, and it too will read 650-Mbyte media. Officials of both companies said media should be interchangeable between the two systems.

The C1716T promises an average access time of less than 24 milliseconds and sustained transfer rates of up to 1.8 Mbytes per second on reads and half that on writes. It can also be used with WORM (write-once-read-many) media.

The drive will be sold on the HP label at a list price of $3,950; the company will sell its 1.3-Mbyte disks at $189 each.

Hewlett-Packard Co.'s Direct Marketing Organization is at P.O. Box 58059, MS511L-SJ, Santa Clara, Calif. 95051. Phone (303) 350-4683 or (800) 826-4111; fax (303) 350-5121. □

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To test the HP ScanJet IIc, we used the same set of tests we used for our most recent color-scanner lab report. The results showed **HP's new scanner to be the best in its class in both hardware and software. The ScanJet impresses from the moment you open the box.** Other scanners use a removable screw that locks the scan head for shipping, but HP uses a locking lever that's built into the scanner itself. There's no screw to lose, and the lever is so easy to use that you'll find yourself locking the scan head more often, thereby increasing its life span.

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**We'd hate to brag. So we'll let the Mac press do it for us.**

*Macworld* awarded both the HP ScanJet IIc and IIp their *World Class Award*, and named the HP ScanJet IIc as the *Best Color Scanner* for 1992, and the HP ScanJet IIp as the *Best Black & White/Gray-Scale Scanner*. While *MacWeek* gave their prestigious *Diamond Award* to the HP ScanJet IIc.

Speed. Simplicity. And accuracy were all applauded. It's no wonder. HP's single-pass scanning delivers both lightning-fast speed and precise color registration. TWAIN support allows scanning without having to switch between applications. And HP AccuPage technology with 400-dpi resolution can tackle the toughest OCR challenges. What's more, capabilities this advanced have never been this affordable. List price on the HP ScanJet IIc is just $1,599. The HP ScanJet IIp is just $879. And right now, the HP ScanJet IIc includes Adobe™ Photoshop LE.

Impressed? Don't just take our word for it, or even the Mac press's. Attend one of our scanning seminars that will be held April through September, 1993. To find out more about the HP ScanJet IIc and IIp or seminars in your area, call 1-800-SCANJET, Ext. 7364*. And judge for yourself.

**HP ScanJet IIc**

**HP ScanJet IIp**

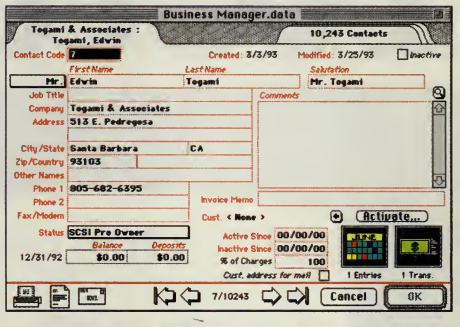
HEWLETT PACKARD

# Transoft adds accounting features

By Kirsten L. Parkinson

Santa Barbara, Calif. — Transoft Corp. last month released Business Manager 1.2, an upgrade that adds new report and accounting features to the $495 information-management application. New features include:

- **Reports enhancements.** Version 1.2 compiles data and produces reports up to 50 times faster than the previous version, according to the company. A new accounts receivable aging report lets users create 30-, 60- and 90-day reports on overdue accounts.
- **Accounting improvements.** Users can keep separate balance sheets and profit and loss information for an unlimited number of different projects or departments within a company. The previous version required all projects or departments to be consolidated into a single balance sheet.
- **File synchronization.** When remote users import contact files to the main database, a consolidation feature automatically updates the data and removes any duplicate records.
- **Calendar entries for letters.** When writing a letter in the program, users can create a calendar entry for the correspondence automatically.
- **More fields.** Transoft has added a country field and expanded its phone-number fields to support international contacts. The program also offers multiple phone-number fields.




**Transoft Business Manager 1.2 adds new fields to its contact database, including a country field for international addresses and more phone-number fields.**

Transoft Business Manager 1.2 is available directly from Transoft for $199 through April 30. Upgrades are $89.95; users who purchased Version 1.0 after Jan. 1 can upgrade free.

Transoft Corp. is at 31 Parker Way, Santa Barbara, Calif. 93101. Phone (805) 963-7181 or (800) 949-6463; fax (805) 963-7178. □

# Helix lets database users board Express for $99

Northbrook, Ill. — Helix Technologies is offering users of any Macintosh or Windows database product a chance to switch to Helix Express 1.0 for $99.

The offer, valid through July 31, saves users $340 off the $439 list price of the object-oriented database.

The "sidegrade," available through dealers as well as directly from the company, includes Helix Express, a demonstration version of the network client software for multi-user applications and four sample applications: Business Management, Contact Management, Personal Document Management and a Recipe-Restaurant Guide.

Additional clients are priced at $199 per license, and the Helix Express Runtime engine sells for $125.

Helix Technologies is at 4100 Commercial Ave., Northbrook, Ill. 60062. Phone (708) 205-1669; fax (708) 291-7091. □

## For the record

An April 12 story about price cuts on PowerBook Duos listed the old prices instead of the new ones for several configurations. The correct prices, after the cuts, are $1,839 for the Duo 210 4/80, $2,299 for the Duo 230 4/80, $2,659 for the Duo 230 4/120 and $2,899 for the Duo 230 4/120 with Express Modem.

An April 12 review incorrectly identified Iomega Corp.'s floptical drive. The device is called the Iomega Mac Floptical.

In the April 12 story on EventMaster, the name of Vector Teknologies Inc. was spelled incorrectly. Users can contact the company's sales office at (503) 357-5558.

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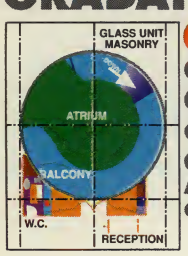


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# Sony drives double DAT capacity

**By Henry Norr**

San Jose, Calif. — It's called DDS-2, but it could have been called Double DDS: A new digital audio tape format and drive Sony Corp. introduced this month promises up to twice the capacity and throughput of drives that follow the current DAT standard, the Digital Data Storage format.

The new Sony drive, a half-height, 3.5-inch mechanism called the SDT-5000, is slated to ship in volume to OEM customers in June with a suggested retail price of $1,995. According to the company, it is the first DAT system to implement the new DDS-2 standard, which was recently adopted by the DDS Manufacturers Group.

The drive will store up to 4 Gbytes of uncompressed data on DDS-2 tapes, a new kind of 120-meter DAT media; current 90-meter tapes can hold up to 2 Gbytes of uncompressed data. With the built-in compression enabled, the drive can store up to 16 Gbytes on a DDS-2 cartridge, according to the company. In a typical Mac environment, users can expect to get about 8 Gbytes of real data on a cartridge through compression.

The SDT-5000 can deliver a sustained transfer rate of 366 Kbytes per second with uncompressed data; with compression, throughput can reach up to 1,464 Kbytes per second, according to the company. The drive's read-write drum spins at 4,000 revolutions per minute — twice the rate of current drives. It can locate and access any file on a 120-meter tape in an average of 35 seconds, Sony said.

The new system will be able to read and write tapes in the current DDS format. It will automatically determine the proper format when a tape cassette is inserted. Other drive features include a 1-Mbyte data buffer; flash memory, reprogrammable from a tape or through SCSI, for configuration parameters; automatic head cleaning; and a notification system that alerts users when use of a cleaning cartridge is recommended and when a tape is becoming worn or producing unusual error rates.

DDS-2 owes its greater capacity to the 33 percent increase in tape length, a narrower track pitch and a new formulation Sony calls Metal Particle Plus. The new formula, featuring a finer, more tightly packed particle coating, also provides improved protection against oxidation, increasing tape-life expectancy from 30 years to about four times that at standard office temperatures and humidity, according to the company.

Sony Corp.'s Data Storage Products Division is at 655 River Oaks Parkway, San Jose, Calif. 95134. Phone (408) 432-0190; fax (408) 943-0740. □

# Philips offers CD-ROMs

Knoxville, Tenn. — Philips Consumer Electronics Co. this month will ship an internal and an external dual-speed CD-ROM drive.

The internal CM405ABK and the external CM425ABK offer an average access time of 265 milliseconds and nonaudio data transfer rates of 300 Kbytes per second. Both drives support the Photo CD format and have SCSI-2 interfaces.

The internal drive, which fits the Quadra 800 and 950, Centris 610 and 650, and the Mac IIvx, will list for $599, while the external model will be $699.

Philips Consumer Electronics Co. is at 1 Philips Drive, P.O. Box 14810, Knoxville, Tenn. 37914. Phone (310) 217-1300 or (800) 835-3504; fax (310) 217-1883. □

# RAM includes CPU, Spiral

Austin, Texas — Technology Works Inc. last month began bundling Connectix Corp.'s PowerBook utilities package with all of its PowerBook RAM upgrades.

Connectix, also based here, normally sells its Connectix PowerBook Utilities (CPU) package for $129, but it will be included free with all purchases of Technology Works' RAM for PowerBooks.

For a limited time, Technology Works will also include in the bundle the Spiral note-taking application it developed. The $129 program, included through the end of April, lets users enter and retrieve text notes without waking up the hard disk.

Technology Works Inc. is at 4030 Braker Lane W., Suite 350, Austin, Texas 78759-5319. Phone (512) 794-8533 or (800) 688-7466; fax (512) 794-8520. □

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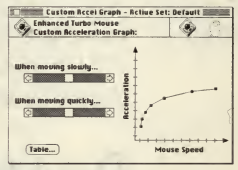


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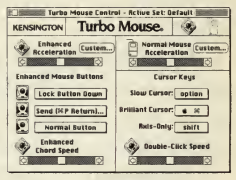


For more information, call 800-535-4242. For information by fax, press 82 and request document 320. Outside the US and Canada, call 415-572-2700.

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# SofTeam ships prerelease version of dynamic-model spreadsheet

## *Lets users examine data in different dimensions*

**By Lisa Picarille**

Newnan, Ga. — SofTeam Inc. this month shipped a work-in-progress version of a new dynamic-model spreadsheet.

Called Flippant, the spreadsheet differs from traditional 2-D spreadsheets by offering dynamic views that let users view data in different dimensions, in the manner of Lotus Development Corp.'s Improv for NeXT and Windows.

The program in prerelease form sells for $129 but will increase to $499 when it is completed; a final ship date has not been set. The features currently supported in Flippant include:

- **English-language category and item names,** instead of cells designated by row and column numbers as in other spreadsheets, to simplify labeling cells and formulas.
- **Automatic series continuation,** which allows users to enter values and have the program automatically continue the progression. For instance, a user can enter just a few dates, and the program will extrapolate into the future.
- **In-cell editing** lets users change the data directly within cells without having to select a separate formula editor.

The program can handle spreadsheets with as many as 16 million cells and 32 categories containing more than 1 million items each. Multiple levels of undo are supported, limited only by RAM.

The company said it plans to enhance the program over the next year, adding support for interapplication communications through Apple events and publish and subscribe and the ability to embed QuickTime movies within worksheets. The current release of the program is monochromatic, but the company said it will support color in a future version, along with one-step graphing functions.

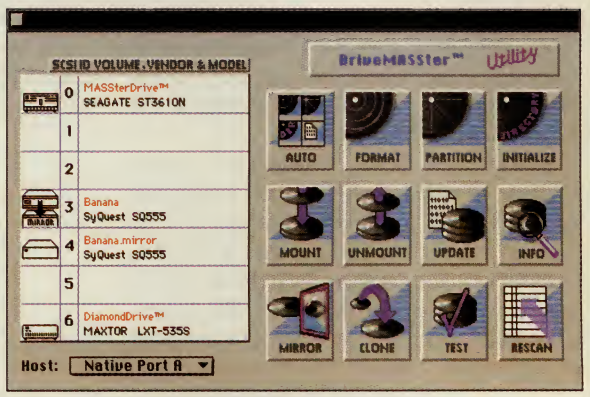
Also due later are support for macros and the ability to read spreadsheets created in other programs, including Microsoft Excel and Lotus 1-2-3. The company said it will send users the additional features free of charge as they are completed.

SofTeam Inc. is at P.O. Box 741, Newnan, Ga. 30264. Phone (404) 304-2025; fax (404) 304-2026. □

# Mass Micro updates SCSI software; DriveMASSter supports RAID Level 1

**By Robert Hess**

Sunnyvale, Calif. — Mass Microsystems Inc. this month introduced its DriveMASSter Utility 1.0, a SCSI disk utility designed to format and configure its storage products.




**Mass Microsystems' new DriveMASSter utility supports RAID 1 mirroring between drives and performs traditional formatting and testing functions on the company's drives.**

The utility supports Mass Micro's DiamondDrive, MASSterDrive, PersonalArray, MASSterArray and DataPak devices. Its most touted feature is support for RAID (redundant array of inexpensive disks) Level 1, also known as disk mirroring. Users may configure one drive to act as a "real-time backup" of another. Even dissimilar devices of different sizes may be used to mirror one another.

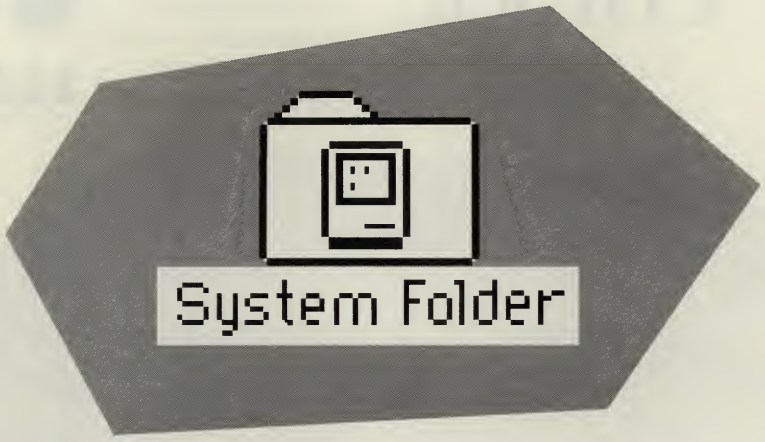
DriveMASSter also supports true SCSI partitioning. Partitions may be password-protected and customized with unique icons. Variable allocation blocks are also supported.

Mass Micro said the package's new driver will dramatically improve performance of its drives. Users with drives and a card supporting Fast SCSI-2 burst-transfer mode can utilize a cloning feature of DriveMASSter to perform a bit-level copy of one volume to another.

Mass Micro said a future version of the utility, due this spring, will support the company's magneto-optical, CD-ROM and floptical devices.

Current owners of all Mass Microsystems products can acquire DriveMASSter for $59.95.

Mass Microsystems Inc. is at 810 W. Maude Ave., Sunnyvale, Calif. 94086. Phone (408) 522-1200; fax (408) 733-5499. □

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# DayStar updates card to support Quadra 800

**By Raines Cohen**

Flowery Branch, Ga. — DayStar Digital Inc. last week announced a lower-priced cache card for its 68040 accelerators and updated its cache card for the Quadras to support the latest member of the family, the Quadra 800.

- **FastCache Turbo.** The new version of DayStar's 128-Kbyte static-RAM cache add-on for its Turbo 040 accelerators works with versions of the '040 cards running at any processor clock speed; 25- and 33-MHz versions of the Turbo 040 are available now, and a 40-MHz version is due soon.

Previously, the company offered two versions of the cache card, one for its 25-MHz accelerators and another that worked with both 25- and 33-MHz cards. The new universal version is priced at $199, compared with $299 and $399, respectively, for the two older cards.

The cache card fits the processor direct slot on the company's Turbo 040 accelerator, increasing performance as much as 70 percent in some cases, according to the company.

- **FastCache Quadra.** DayStar also modified its FastCache Quadra, another 128-Kbyte static-RAM cache card, to support the Quadra 800. The company offers two versions of the card, one for the 25-MHz Quadra 700 and 900 and another model, using faster components, for the speedier Quadra 950 and now the 800.

Owners of the 950-compatible FastCache Quadra can upgrade free with proof of Quadra 800 ownership.

DayStar Digital Inc. is at 5556 Atlanta Highway, Flowery Branch, Ga. 30542. Phone (404) 967-2077 or (800) 962-2077; fax (404) 967-3018. □

# Applied Engineering adds FPU to LC III

**By Raines Cohen**

Dallas — Applied Engineering this month introduced a $109 math coprocessor card for the Macintosh LC III.

FastMath LC III uses a 25-MHz Motorola 68882 FPU (floating-point unit) chip. The board plugs into the math coprocessor socket on the LC III's logic board.

The company said the card allows statistical applications to run three times as fast. It also enhances performance in other math-intensive programs, including spreadsheets, scientific-visualization applications and computer-aided design systems, according to Applied.

The company also sells versions of FastMath LC, an FPU-on-a-card that fits in the processor direct slots of the older Mac LC and LC II. FastMath Classic likewise adds a math chip to the Mac Classic.

All Applied cards come with a one-year warranty.

Applied Engineering, a division of AE Research Corp., is at 3210 Beltline Road, Dallas, Texas 75234. Phone (214) 241-6060 or (800) 554-6227; fax (214) 484-1365. □

# Pericles upgrades statistical app to keep closer tabs on survey data

**By Jon Swartz**

Perrysburg, Ohio — Pericles Software last month announced an upgrade to its cross-tabulations statistical application for the Mac.

TabHouse, released last year (see MacWEEK, Nov. 23, 1992), helps users design surveys and collect and analyze the results. The program supports as many as 32,000 variables. The number of records or cases is limited only by disk space.

TabHouse 1.5, now shipping, includes Pericles Data Entry (PDE), a pair of applications that let users design electronic surveys and then collect data using on-line questionnaires that assemble the resulting data into tables without additional typing. Survey designers can set up skip patterns to change the order in which interview screens appear based on the value entered in a particular field.

Other new features include grouping of frequencies and percents by associated value, the ability to conduct t-tests between columns, and random sampling of data.

The new version also runs as much as three times faster than Version 1.0, according to the company.

Steve Schiller, associate research director at Warwick Baker & Fiore, an advertising agency in New York, said TabHouse's ability to export data to Microsoft Excel is especially useful. "It's great for analysis since it's designed specifically for market research cross-tabs," he said.

TabHouse 1.5 costs $695; quantity discounts and site licenses (including a 25 percent discount for nonprofit organizations and educational institutions) are available. Upgrades are free. Networked use of PDE costs $30 per user.

Pericles Software is at P.O. Box 311, Perrysburg, Ohio 43552. Phone (419) 872-0966; fax (419) 872-0441. □

# New atoms charge up Apple Installer scripts

**By Robert Hess**

Dallas — StepUp Software this month shipped InstallerPack, a package of several new Installer "atoms" that let developers incorporate graphics, sounds, file compression and custom folder icons into installation scripts.

Atoms are resources developers add to scripts for Apple's Installer software to enhance its capabilities. StepUp's $219 collection adds four types of features to the Installer:

- **Graphics.** The ShowPICT atom will display any PICT resource in its own window during the installation process. The graphics can be any size and either color or black and white. Script writers can use ShowPICT to provide the user with additional information.
- **Sound.** Developers can alert and entertain users during an installation process by implementing StepUp's PlaySound atom.
- **Compression.** StepUp offers decompression engines for files compressed with Diamond from Soft Technologies of Beduer, France, and Compact Pro from Cyclos Software of San Francisco. As a result, developers can distribute large files on small media, such as floppy disks, and decompress the file only when the package is installed.

Developers that want to distribute Installer scripts that use the Extractor Action Atom will also need to license ExtractorCR from Cyclos Software. Likewise, developers publishing scripts based on the XDiamond Action Atom will also need to license an external compressor from Soft Technologies.

- **Icons.** Developers can give their installed software folders custom icons with the CustomFolderIcon atom.

All four atoms will also work with StepUp's ScriptGen Pro, an Installer script generator due this spring.

StepUp Software is at 3883 Turtle Creek Blvd., Penthouse 10, Dallas, Texas 75219. Phone (214) 520-7717. □

# EndNote gets FrameMaker, Nisus support

**By Lisa Picarille**

Berkeley, Calif. — Niles & Associates Inc. last week shipped updated versions of its EndNote and EndNote Plus bibliographic programs, adding support for both the Nisus word processor and the FrameMaker publishing system.

Both applications let users build bibliographies as they write and paste citations formatted in many standard notations into document text. EndNote Plus supports more-advanced database functions, including complex searches and sorts. Both include a full-featured stand-alone application and a more limited desk accessory.

Both new versions, EndNote 1.6 and EndNote Plus 1.3, now work with Nisus, the word processor from Nisus Software Inc. of Solana Beach, Calif., and the FrameMaker publishing system from Frame Technology Corp. of San Jose, Calif.

Both programs already work with a number of other Mac word processors, including Microsoft Word, WordStar International Inc.'s WriteNow 3.0 (formerly published by T/Maker Co.), WordPerfect, and Claris Corp.'s MacWrite 5.0 and MacWrite II.

Niles said it also fixed a few minor bugs in the new releases and added support for properly citing a publication with multiple editors.

EndNote is priced at $149, and EndNote Plus costs $249. Users of either program can upgrade to the new version for $19. Current EndNote users can switch to the new version of EndNote Plus for $99.

Niles & Associates Inc. is at 2000 Hearst Ave., Suite 200, Berkeley, Calif. 94709. Phone (510) 649-8176; fax (510) 649-8179. □

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# Sales Synergy lets users update contact information remotely

By Kirsten L. Parkinson

Palo Alto, Calif. — A new sales-automation package from Metropolis Software Inc. helps both remote and in-the-office users keep their contacts and activities up to date.

Showcased at this month's Apple Enterprise Computing Conference in San Francisco, Sales Synergy consists of a Sybase or Oracle SQL server database and a client application, written in ACI US Inc.'s 4th Dimension, for managing contacts and scheduling events.

Each client machine contains a subset of the server data, which users can modify as needed. When users reconnect to the server, either remotely or via a LAN, the program can determine the most recent changes automatically and synchronize the information on the server and on the client, updating individual fields as necessary.

Aimed at companies with 50 or more users, Sales Synergy lets users store information on contacts, activities and projects. Multiple contacts can be linked to a single company's entry.

The calendar function includes yearly, monthly, weekly and list views. A Sales Opportunities feature lets users track projects or leads and link them to contacts in the database.

Users can choose to have Metropolis customize Sales Synergy in a number of ways. For example, conflict-resolution features can be added to detect when two users modify the same field entry. Recurring-event support can be added to the calendar. The company said it can also customize the program to run with other relational database servers.

A basic Sales Synergy configuration with no customized features costs $20,000 for the server and $995 per user for the client application. The price does not include installation or training.

Metropolis Software Inc. is at 505 Hamilton Ave., Suite 305, Palo Alto, Calif. 94301. Phone (415) 322-2001; fax (415) 327-5579. □

# Templates get back to business basics

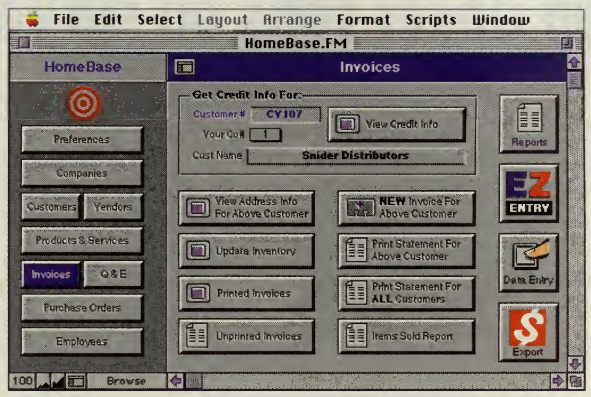
By Lisa Picarille

Simi Valley, Calif. — Working Solutionz Software is readying an upgrade to its BIZ Basics set of interactive business templates for Claris Corp.'s FileMaker Pro 2.0.

BIZ Basics Pro, due next month for $249, consists of a set of seven templates that help users access, view and manipulate FileMaker Pro databases. Each template addresses a specific business function, including inventory control; tracking customers and vendors; invoicing, generating and tracking purchase orders; managing products and services; and updating employee records.

The upgrade of the program includes a new inventory-control template, an optional rudimentary data-entry screen, as well as a way to simplify the management of these templates, which are each treated as individual modules within the BIZ Basics Pro application.

The new HomeBase Command Center gives users a central location for navigating through the modules. From within the HomeBase Command Center users can directly open all BIZ Basics Pro files, print reports, enter data, export data, update lists and view information. In previous versions, users had to open the individual templates and files.




**Working Solutionz's BIZ Basics Pro includes a HomeBase Command Center that lets users create reports and navigate between databases without switching screens.**

"The HomeBase Command Center helps keep you focused on where you are," said Jeff McWard, a BIZ Basics Pro beta tester and president of In-Depth Electronics, an on-line service provider in San Jose, Calif.

McWard said his company uses the templates to do billing and shipping, as well as to track customer calls to the company's host system and then export the data to GeoQuery Corp.'s GeoQuery 3.0 mapping application to analyze the calls by location. He said he previously handled these tasks manually.

Current BIZ Basics users will be able to upgrade at a price not yet set.

The company also offers Shipper, an optional $179 add-on module, to help users mail and ship packages. The template set includes 40,000 ZIP codes for United Parcel Service and U.S. Postal Service rate and zone look-up. A bundle of BIZ Basics Pro and Shipper will sell for $349.

Working Solutionz Software is at 2191 Rosecrans St., Simi Valley, Calif. 93065. Phone (805) 522-2170; fax (805) 527-7787. □

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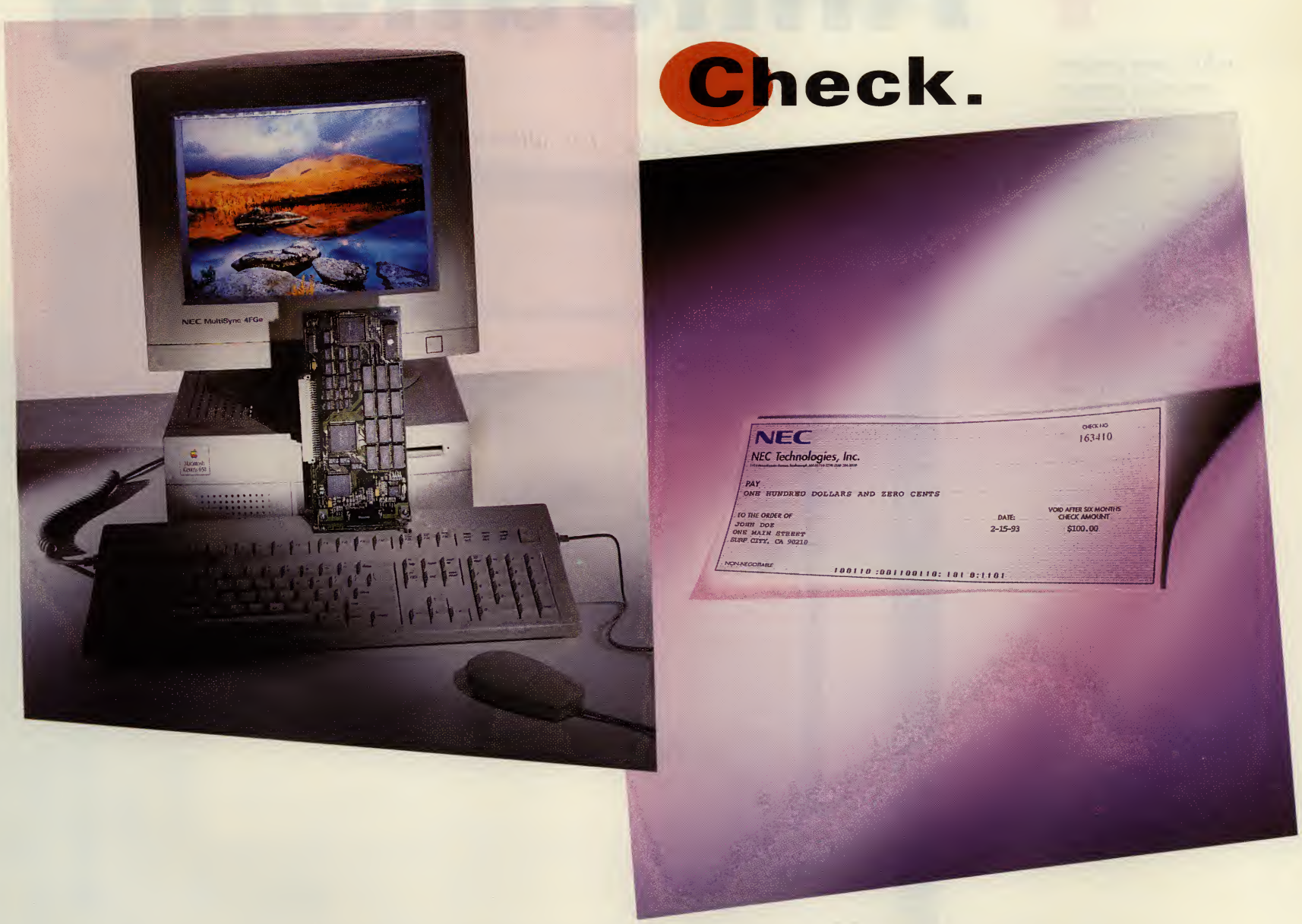


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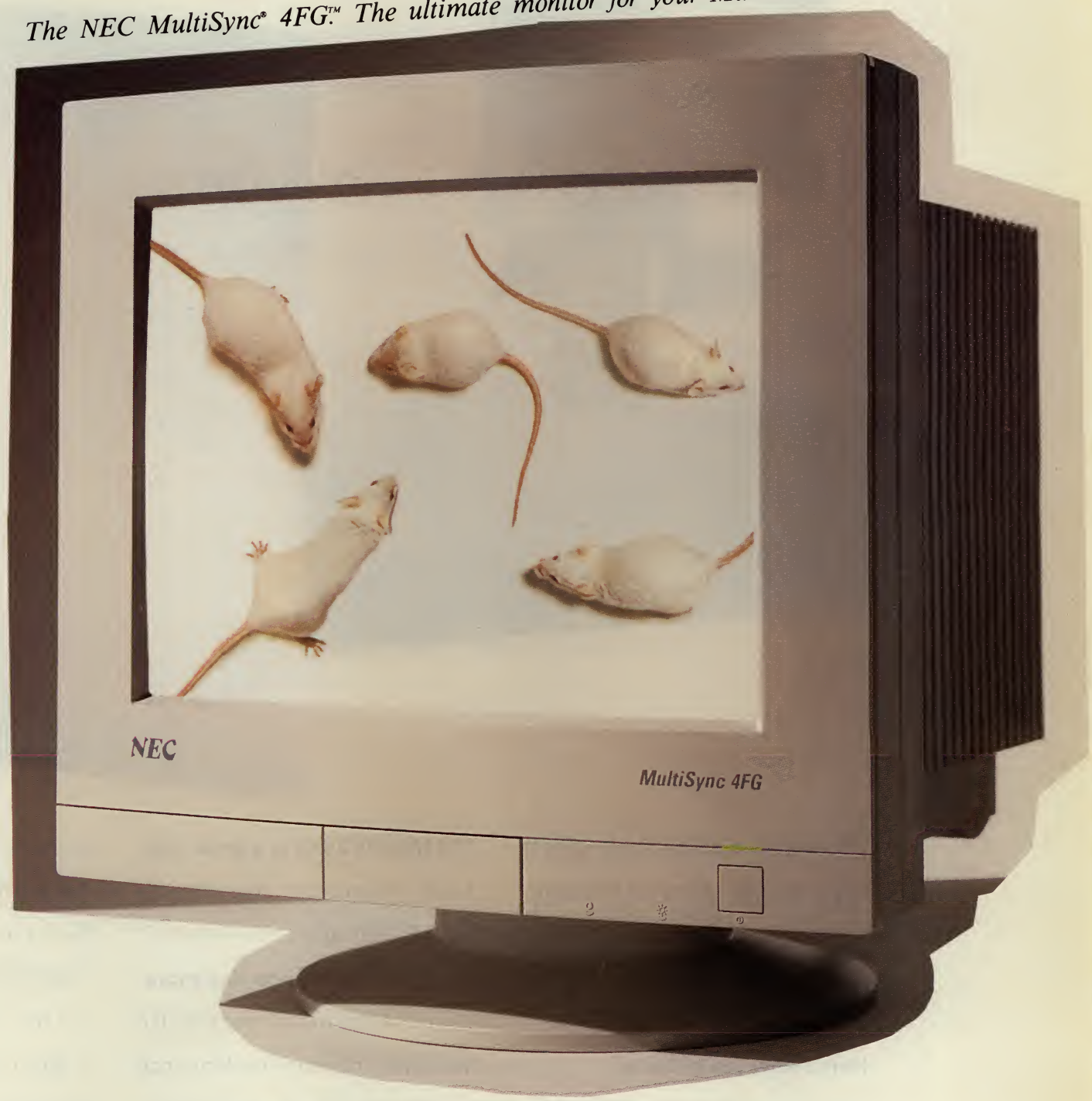


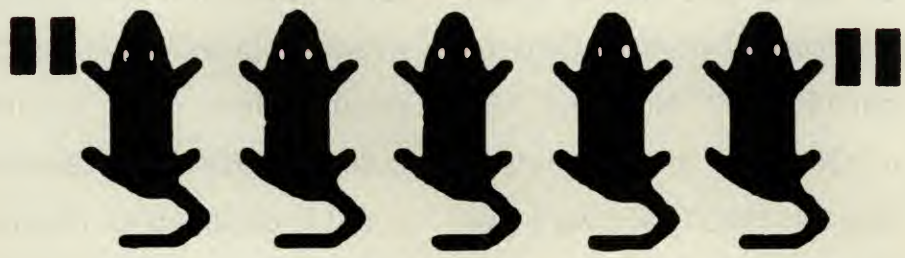

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Management

# Managers turn to high tech for more-productive meetings

*Meetings held with software and hardware assistance can generate better results.*

By Jeff Ubois

Computers have radically changed the way users work individually. Now they are changing the way users work together.

Moving Macs into the conference room is an effective way to help managers make better decisions in less time. Mac-based meeting support systems let users pool their ideas and information via large projection screens, LANs and screen-sharing software.

Many programs support brainstorming, list manipulation, voting, and ranking of proposals and ideas. Nearly all can be used to create a final document everyone can carry away with them.

Proponents say these systems radically change the way meetings work. Anonymous input allows ideas to be judged on their merits rather than by who proposed them. Simultaneous writing in brainstorming sessions lets everyone have their say and helps develop a wider range of options.

Displaying the same information to everyone discourages political games and raises the level of dialog. And the final set of notes helps build consensus.

"The relatively undiscovered use of the Mac is in the meeting," said James Halcomb of Halcomb Associates in Sunnyvale, Calif. "In most meetings you have several loudmouthed idiots and a couple quiet geniuses, so what do you think a plan coming out of a meeting like that is going to look like?"

**Computer support.** Halcomb and others said such plans can look a lot better if they have evolved in meetings that have had the advantage of computer support.

At the NASA Ames Research Center in Mountain View, Calif., William Crawford, Macintosh network manager, has been experimenting with PowerBooks and a product called Council from CoVision Inc. of San Francisco. Meeting participants have their own machines and can view or take control of the screen of any other participant.

"We find it seriously cuts down on the amount of time a meeting takes," Crawford said. "It can draw out comments from normally silent people, and it may also help people feel more committed to the results since they feel they have had more input."

With Council, meeting participants can simultaneously key in their thoughts, vote and rank alternative proposals, keep meeting notes, and produce a final document detailing the decisions made.

"It allows everybody to talk at once with their fingers and lets the group sort and screen items," Crawford said. "It can help take input from several people and massage it into some kind of an agreed-on solution — you walk away from the meeting with printed results, or results that can be transmitted electronically."

**Social ramifications.** The technology has an immediate social impact. "As you can imagine, this changes the control hierarchy of a meeting," Crawford said. "It can make verbal communication almost nonexistent, and you can run an entire meeting without talking if you want to."

Anonymous input is an important feature. "Anonymous input helps bring out ideas from people who may not normally get their ideas out or who may be hesitant to defend them," Crawford said.

**Dedicated meeting rooms.** Another company using Macs in the conference room is Electronic Data Systems, which has built a special facility in Detroit that hosts meetings for the entire company. The conference room has eight Macs built into a table and two large-screen projectors.

"We found it's a productivity tool, plain and simple," said Beverly Grau, who manages the facility. "We calculate that we save 50 percent of the time normally spent in a typical conference room, and for some work, such as process modeling, it is more like a 90 percent savings.

"It makes meetings more focused, saves time, gives everyone an end product to take away and helps get full participation," Grau said. "The strong personality doesn't control the agenda or creativity process."

**Opening up the floor.** Grau uses a collaborative writing product called Aspects from Group Technologies Inc. of Arlington, Va., which lets meeting participants key in their ideas on a common window. "It cuts the time in half or better because it allows simultaneous input," Grau said. "Then in the discussion there is a greater variety and depth to the ideas."

MIKE DITZ

**Beverly Grau manages Electronic Data Systems' conference room, which has eight Macs built into a table.**

Computerization is particularly critical for meetings that require technical input from several people. "In process modeling, we couldn't get off the ground when we had to do it manually with flip charts and markers because it wasn't editable," Grau said.

Other software products developed for personal use are also appropriate for meetings. "An outliner is good for ordering things after a brainstorm; we use drawing and painting programs for process modeling; we use a mind-mapping tool called Inspiration [from Ceres Software Inc.], and Fair Witness [from Chena Software Inc.], which is partly project planning and work processing," Grau said. "Which tool we use depends on the objective."

**Preparation is key.** But the EDS facility doesn't rely on the technology alone to improve the meetings. Before managers can use the facility, they need to map out what they hope to accomplish in the meeting.

During the meeting, a facilitator helps participants use the technology and stay on track.

"It is a motivating environment because you see work actually getting done," Grau said. "You get a different level of team binding and consensus because everybody has had their input."

Grau said the system doesn't just change the meeting, it changes what happens afterward. "Because it's electronic, people leave with their work product — they don't have to wait for minutes and for people to get back to them. It's all very clear, and everybody knows who agreed to what because it is documented," Grau said.

**Economical alternatives.** There isn't any one way to set up software and hardware for meeting support. While some users, such as those at Ames and EDS, have the benefit of high-end, special-purpose facilities, others take a more ad hoc approach.

Ken Petron, manager of organizational training and development at the Electric Power Research Institute in Palo Alto, Calif., uses a lower-tech/lower-cost approach, relying on an LCD projection pad that can be moved easily and set up practically anywhere, and off-the-shelf software such as Symantec Corp.'s MORE 3.0. But he gets many of the same benefits as users with special-purpose meeting rooms.

"What we are trying to gain by this is a lot more productivity in a shorter period of time," Petron said. "If you are using it to brainstorm, it is much quicker to sort and group and change and reorganize information using the computer.

"The fact people see their ideas up in print has an impact — they see their thought was captured and that they have some input," Petron said. "Another enhancement of using the computer is you can hand notes out at the end of the meeting, so again, people can walk out and see their comments and feel a lot more ownership of that information."

Petron also emphasizes that the benefits come from changes in the meeting process, not the technology per se. "For the first few meetings it's kind of glitzy new technology, and you have to get over that so people don't get entranced in the technology," he said.

Crawford also started out with a

*See Meetings, Page 16*

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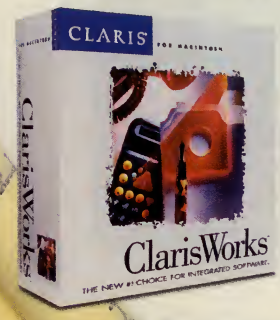


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## Meetings

*From Page 14*

low-cost approach. "We started ad hoc with just a bunch of PowerBooks on a table, and it worked fine. There is no critical need for a big expensive room," he said. "But you do need a lot of computers, and setting up and doing wiring is a hassle, so we are retrofitting a conference room."

But Crawford has problems with large monitors and projection pads because they are incapable of displaying long lists or easily showing multiple columns. "If you make the characters big enough to be seen easily, you can't get enough information up on the screen," Crawford said.

**When to meet with Macs.** Computer systems aren't a panacea for boring or non-productive meetings. As Halcomb said, "The big warning is don't go out and buy MacPaint and expect to become a Picasso, and don't buy MacProject and expect to be a manager."

Experts say computers help most when meetings have a definite set of functional goals rather than a political agenda. "This is best used where you get a group of experts to think on a particular topic," said Lenny Lind, CoVision president. "The idea is to maximize their output during their time together so they can dump out a a lot of ideas on the first round and then have a higher-quality discussion on the second round." □


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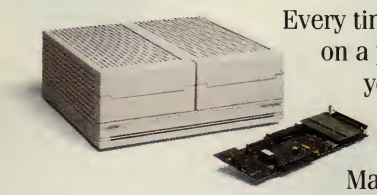

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## Calendar of Events

### APRIL

**26-29:** NCGA '93, Philadelphia. Fourteenth-annual conference dedicated to computer graphics applications for engineering and business graphics. Contact the National Computer Graphics Association at (703) 698-9600; fax (703) 560-2752.

**27-29:** Monterey Software Conference, Monterey, Calif. Discussions on past, present and future of software engineering. Contact Digital Consulting Inc. at (508) 470-3880; fax (508) 470-0526.

**29-May 2:** MCN International Consultants Conference, Peachtree City, Ga. Includes product reviews, presentations and interaction with developers. Contact the Macintosh Consultants Network at (209) 545-0569 or (800) 729-4626; fax (209) 545-0279.

### MAY

**2-5:** MacIS USA, San Antonio. Conference covers the Macintosh as a basis for collaborative computing with workshops on group decision-making techniques. Contact MacIS at (513) 398-7500; fax (513) 398-7503.

**3-6:** DB/Expo 93, San Francisco. Database, client-server and information technology are the topics of this conference and expo. Contact NDN Enterprises at (415) 966-8440 or (800) 232-3976; fax (415) 966-8934.

**3-6:** Interactive '93, Anaheim, Calif. Multimedia and computer-based training developers expo, as well as many discussion sessions. Contact Ziff Institute at (617) 252-5119; fax (617) 252-5222.

**4-6:** DevCon '93, Costa Mesa, Calif. Conference for developers using Smalltalk/V, Team/V and the PARTS Workbench. Contact Digitalk at (310) 645-1082 or (800) 531-2344; fax (310) 645-1306.

**9-13:** Apple Worldwide Developers Conference, San Jose, Calif. Meetings and displays for Macintosh developers. Contact CMI at (415) 705-8050; fax (415) 291-0126.

**11-13:** Computer Storage Exposition and Conference, Anaheim, Calif. Storage security and PCMCIA will be discussed, and new technologies will be displayed. Contact Eberhard & Co. at (212) 486-6186; fax (212) 486-6481.

**16-20:** Comnet '93, Dallas. Conference and expo on voice, data and telecommunications. Includes demonstrations of wireless technology. Contact World Expo Corp. at (508) 545-3976; fax (508) 872-8237.

*Please submit notices of conferences, trade shows and other Mac-related events to Calendar, MacWEEK, 301 Howard St., 15th Floor, San Francisco, Calif. 94105, or fax to (415) 243-3650. No training or educational seminars please.*

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# Gateways

- Networking
- Communications

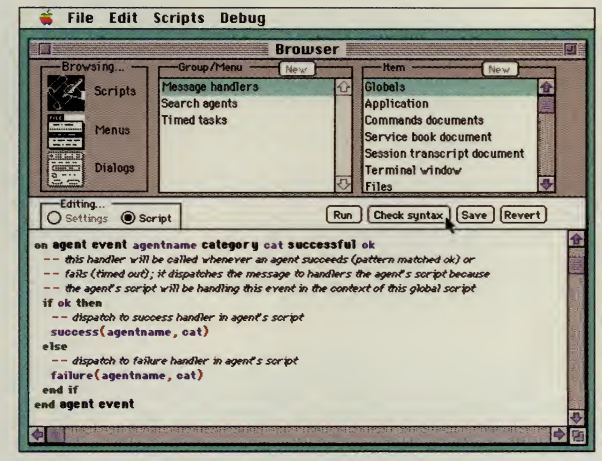
## Full Moon shines on scriptable app

### *commstalk Server supports AppleScript*

**By Nathalie Welch**

San Jose, Calif. — Full Moon Software Inc. this month announced an AppleScript-based stand-alone version of its host access tool that will let any scriptable application interact with host systems through user-written scripts.

commstalk Server, announced at this month's Apple Enterprise Computing Conference in San Francisco, is due this summer for less than $1,000. The company previously offered its commstalk technology, which recognizes patterns in terminal data transmitted by host systems, only in the form of external code resources for HyperCard and ACI US Inc.'s 4th Dimension database.




**Full Moon's new commstalk Server includes an application-generation tool called CTEdit, which will let users edit the script of an application object.**

The host application does not need to be modified because Full Moon's software simulates a user interacting with a character-based terminal.

commstalk Server will come in two pieces: CTServer, the communications engine, and CTEdit, a tool that lets users develop front ends by building interfaces and writing scripts that control CTServer.

commstalk Server will ship with Apple's Basic Connectivity Pack, which includes VT100 and TTY terminal-emulation tools and modem and serial tools for the Macintosh Communications Toolbox.

The program's reliance on AppleScript, Apple's systemwide scripting language, means users will be able to build custom applications that work with off-the-shelf scriptable applications, such as Microsoft Excel 4.0. It will also support scripts written in other Open Scripting Architecture-compliant

*See Full Moon, Page 20*

## Sybase opens gateway to make SQL call on Oracle, IBM databases

**By Mitch Ratcliffe**

Emeryville, Calif. — Sybase Inc. this month shipped an extension to its Open Server database-management system that will let computers running its Open Client software get transparent access to non-Sybase relational and flat-file databases.

OmniSQL Gateway is the first product in the company's Sybase System 10 family of server and gateway products (see MacWEEK, Nov. 16, 1992). It provides support for Global Stored Procedures, which let Sybase servers encapsulate Sybase SQL queries in the native dialects of Oracle and IBM databases, or it can channel them into the query structures of local flat-file databases.

Corporate developers will realize shorter development cycles when using Global Stored Procedures and OmniSQL Gateway, the company said, because they provide a uniform development environment for building applications.

When installing OmniSQL Gateway, developers must copy tables from all the supported databases into the Sybase server, which maps their data to provide a unified view of all connected databases. Users will then be able to send a query constructed in Sybase's Transact-SQL dialect that returns data from multiple databases.

For example, the $399 DataPrism from Redwood City, Calif.-based Brio Technologies Inc. can create a single query that will return relevant data from Sybase, Oracle and DB2 servers transparently, after OmniSQL Gateway has been configured on the Sybase host.

"I spent three to four days working full time on the C code and copying tables over when I first installed OmniSQL, and now it takes only a couple of hours to write procedures to do almost anything we want," said John McCall, an electrical engineer at the U.S. Navy's Naval Undersea Warfare Center in Keyport, Wash.

OmniSQL Gateway is priced from $2,550 to $102,460, depending on the server platform and number of users.

Sybase Inc. is at 6475 Christie Ave., Emeryville, Calif. 94608. Phone (510) 596-3500; fax (510) 658-9441. □

**News Analysis**

## Four FTP server choices for the Mac

**By Robert Hess**

Booragoon, Australia — The skyrocketing demand for Internet services has increased the pressure on Mac managers to adeptly manage TCP/IP communications. While several well-known programs address this problem, a newly revised shareware application aims at making Internet file transfers as easy as System 7 file sharing.

The $10 FTPd, written by Peter Lewis, turns a Mac into an FTP (File Transfer Protocol) server. It uses the group, user and folder privileges from System 7's file sharing, so Mac owners can work with a familiar metaphor to carefully restrict incoming FTP clients to appropriate areas of the owner's disk. FTPd requires 196 to 293 Kbytes of RAM.

FTP server software has long been available on the Mac as a part of other TCP/IP-based communications packages. It's an attractive alternative to other file-service methods because of the ubiquity of the Internet as a transport mechanism and the availability of client software on virtually all computer platforms.

FTP software generally offers two types of user accounts: anonymous and recognized. Anonymous users log onto an FTP server with the account name "anonymous" and, by convention, their electronic-mail address as their password. Recognized users must have an account previously established by the owner with an agreed-upon password.

NCSA Telnet, a public-domain application developed by the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign and Brigham Young University in Salt Lake City, is primarily intended for users to log onto remote computers. Included in the application is an FTP server, which makes a user's disk accessible to remote anonymous users running any FTP client. Incoming callers begin in an owner-specified folder but may leave that folder, thereby gaining considerable access to the owner's disk.

Synergy Software's $295 VersaTerm Pro comes with a system extension that mounts one folder as a network volume. The server's owner establishes up to four account names and passwords for those who may access these folders and specifies whether those users may write to the owner's disk. Like NCSA Telnet,

*See FTP, Page 20*

## MacNet enters PB Ethernet connectivity race

### *SCSI device supports three wiring choices*

**By April Streeter**

San Jose, Calif. — Yet another Macintosh networking vendor will provide Ethernet connectivity for the legions of roving PowerBook users.

MacNet next month plans to ship the $329 SCSI 490-PB, which can connect a PowerBook through a SCSI port to a thick, thin or 10BASE T Ethernet network.

SCSI 490-PB measures 6.9 by 4.7 by 1.5 inches. It has an external power supply and a series of LED indicators for power, link integrity, data send and receive, and network collisions.

MacNet joins Asanté Technologies Inc., Compatible Systems Corp., Dayna Communications Inc. and Focus Enhancements Inc. in offering PowerBooks a compact way to connect to an Ethernet network. Different vendors offer different combinations of the three Ethernet media types, and variations exist in size, weight and price exist (see chart).

**Ethernet to go: Portable SCSI adapters**

| COMPANY | PRODUCT | DIMENSIONS (IN INCHES) | PRICE | MEDIA SUPPORT |
|---|---|---|---|---|
| Asanté Technologies Inc. | EN/SC | 7.75x4x1.5 | $459 | 10BASE T/thick /thin |
| | Mini EN/SC | 4.3x2.75x1 | $399 | 10BASE T or thin |
| | Mini EN/SC-10T | 4.3x2.75x1 | $450 | 10BASE T/thin |
| Dayna Communications Inc. | SCSI/Link | 6x3x1.75 | $429 | 10BASE T or thin |
| | SCSI/Link-3 | 6x3x1.75 | $499 | 10BASE T/thick/thin |
| Focus Enhancements Inc. | EtherLAN SC | 7.5x5.5x1.5 | $199.99 | Thin |
| | EtherLAN SC-T | 7.5x5.5x1.5 | $219.99 | Thin |
| MacNet | SCSI 490-PB | 6.9x4.7x1.5 | $329 | 10BASE T/thick /thin |
| Compatible Systems Corp. | Ether + | 7.5x4.7x1.5 | $495 | Thick/thin or thick/10BASE T |

Asanté's Mini EN/SC is the smallest device, while Focus' EtherLAN SC and SC-T do the least damage to a buyer's pocketbook.

MacNet, a division of CNet Co., is at 2199 Zanker Road, San Jose, Calif. 95131. Phone (408) 954-8000 or (800) 486-2638; fax (408) 954-8866. □

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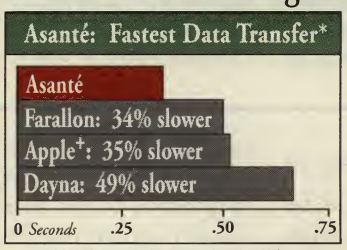


**32K file transfer between a Quadra 950 and Quadra 700. Source: Recommended Test Labs, Inc. 1993. Call Asanté for complete report.*

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# Client-server apps to add scripts

## *Development tools will focus on C++*

**By April Streeter**

San Francisco — Two Macintosh applications scheduled to ship in July join an expanding repertoire of client-server development tools that support Apple technologies such as AppleScript, Data Access Language and Apple Open Collaboration Environment.

Inference Corp. is readying ART*Enterprise, which combines object-oriented C++ development tools with a rule-based editor, such as those found in expert systems. Visix Software Inc. is preparing a Mac version of Galaxy, its object-oriented C++ tools.

At this month's Apple Enterprise Computing Conference here, both companies promised that their tools will enable large sites to build applications that can support AppleScript scripting, access a variety of databases using Data Access Language and, in Galaxy's case, use the mail and messaging services in the forthcoming AOCE.

**Visix Software's Galaxy has a dialog box design editor that features "springs and struts," shown here as dotted blue lines, that specify how windows and buttons in an application will resize.**

▶ **ART*Enterprise.** Inference said it anticipates users building applications with its program will import legacy data from a mainframe. ART*Enterprise automatically generates objects from object libraries to represent the mainframe data, and a user interface can be constructed on top. Rules are added from a list included with the program or generated via an English-like scripting language.

The company said ART* Enterprise itself can be controlled with AppleScript, and end users will be able to record, modify and replay AppleScript scripts.

ART*Enterprise costs $6,995 per user. Runtime fees are $699.

▶ **Galaxy.** Galaxy's strongest feature, according to Visix, is the ease with which applications can be recompiled and ported to different environments, including Windows, Unix and OS/2. The program's application programming interface has a Distributed Application Services component that lets developers add network services to applications.

Built-in tools include a text editor; a project browser; and "springs and struts," which can help users developing graphical user interfaces for multiple platforms set up resizing rules for windows and buttons.

Galaxy costs $7,800.

Inference Corp. is at 550 N. Continental Blvd., El Segundo, Calif. 90245. Phone (310) 322-0200; fax (310) 322-3242.

Visix Software Inc. is at 11440 Commerce Park Drive, Reston, Va. 22091. Phone (703) 758-8230 or (800) 832-8668; fax (703) 758-0233. □

# MacApp development module molds client-server systems for MitemView

**By Nathalie Welch**

San Jose, Calif. — Corporate developers relying on MitemView to link Macs to mainframes can now combine its client-server capabilities with Apple's MacApp object-oriented development environment.

MitemView 3.2, available now from Mitem Corp., can be used with the company's $2,900 MacApp module to create client-server applications. The base price for MitemView is $7,000.

When developing with MacApp, interface interactions and local processing logic are compiled, providing greatly improved performance over interpreted environments, such as HyperCard, according to Mitem.

MitemView lets Mac front-end applications extract and process data from mainframes by interpreting the content of terminal screens. Mitem's tools let the desktop program connect to multiple hosts simultaneously through a variety of communications and terminal-emulation protocols.

The software currently works with ACI US Inc.'s 4th Dimension, HyperCard and Aldus SuperCard. Back-end translators are included for IBM, DEC VAX, Tandem and Unix host-based systems.

Mitem Corp. is at 2105 Hamilton Ave., Suite 350, San Jose, Calif. 95125. Phone (408) 559-8801; fax (408) 559-7201. □

## Full Moon

*From Page 18*

environments, such as UserLand Frontier 2.0.

The program comprises:

▶ **CTEdit.** The package's authoring environment will let users write and edit scripts and define menus and dialog boxes to control CTServer.

▶ **CTServer.** The server application will perform the actual host communications, triggering scripts when it recognizes user-configured patterns. It will support several Apple-event suites and the Apple-events Object Model so that other Apple event-aware applications will be able to directly interact with the program, and scripts will be able to trigger program actions and modify its behavior.

CTServer will be able to open command documents containing message format definitions, scripts, tasks set to trigger at predefined times or intervals, as well as menus and other user-interface elements. The program will be attachable, so users can associate custom scripts with existing interface elements, and "tinkerable," so users can change the interface itself.

Full Moon said it will sell commstalk Server in a developers kit and licensable runtime form (including just CTServer, not the editor) at prices not set. The company will also supply modules that support additional communications protocols through the Comm Toolbox, Data Access Language queries, and messaging systems such as AOCE (Apple Open Collaboration Environment) and Vendor-Independent Messaging.

Full Moon Software Inc., the U.S. arm of England-based commstalk-hq, is at P.O. Box 700237, San Jose, Calif. 95170-0237. Phone (408) 253-7199; fax (408) 252-2378. □

# BlitzMail graduates into commercial market

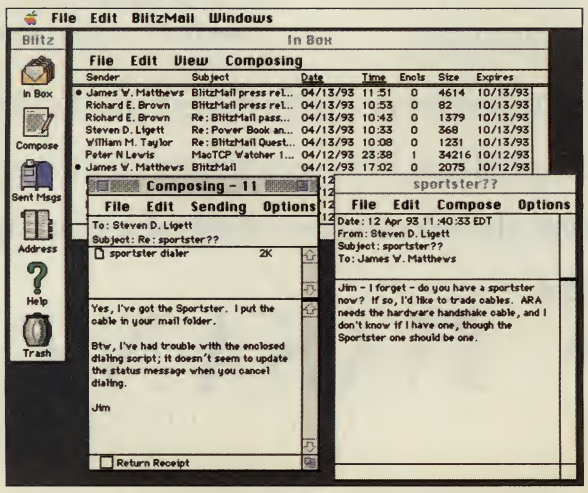
**By Nathalie Welch**

Hanover, N.H. — The electronic-mail market has a brand-new entrant, freshly matriculated from the ivy-covered halls of Dartmouth College.

The recently commercialized BlitzMail, used at Dartmouth since 1986, is a Unix-based E-mail system built around two back ends: the BlitzMail server and the DND (formerly called the Dartmouth Name Directory). Both servers reside on top of the NeXTstep 2.1 operating system, but because of NeXT Computer Inc.'s decision to stop making hardware, Dartmouth is evaluating alternative platforms.

The two servers can run on separate machines, and multiple BlitzMail servers can share one DND. The BlitzMail server requires an SMTP (Simple Mail Transfer Protocol) mail hub to send messages over the Internet.

Mac and Unix clients are available for BlitzMail. Mac clients must have Apple's MacTCP and be connected to the server via a TCP/IP network.




**BlitzMail, an electronic-mail package developed at Dartmouth College, is now commercially available and offers both Mac and Unix clients.**

Compatible with System 6 and later, the BlitzMail client takes advantage of Apple events and is scriptable and recordable using AppleScript or UserLand Frontier.

Messages can include an unlimited number of enclosed Mac files. With no local message-filing facility, messages can be archived only by being saved as Mac text files on the user's hard disk.

Dial-in is possible via AppleTalk Remote Access, Serial Line Internet Protocol or Point-to-Point Protocol.

"Everyone on campus uses BlitzMail; I would be a social reject if I didn't," said Espen Koht, a student and computer consultant at Dartmouth, who trains students on the system. "It takes the students less than a day to get up and running."

BlitzMail is available in a 100-user pack for $3,000. An unlimited-user license is $15,000, or $3,000 for educational and nonprofit groups.

Dartmouth College Software Sales is at 6028 Kiewit Computation Center, Hanover, N.H. 03755. Phone (603) 646-2643; fax (603) 646-2810. □

## FTP

*From Page 18*

remote clients may exit the folder where they begin and browse other parts of the owner's disk.

InterCon Systems Corp.'s TCP/Connect II, priced from $195, offers similar functionality, but the owner of a server may create any number of users and assign them to a single folder, each with read-only or read-write access. Users may traverse the contents of their folder if the owner gives them full permission, but they may not exit their folder to explore other areas of a disk.

FTPd (for "FTP daemon") offers considerable security since owners may use file-sharing privileges to give multiple users access to the same folder but restrict each user in a different way.

Once a Mac is configured for file sharing, the owner may simply run FTPd and wait for incoming FTP clients or file-sharing users. In addition to file sharing's own security, owners may impose more (but not less) restrictions on their FTP users' use of volumes. An owner may configure FTPd to make other shared volumes on the network available to incoming FTP callers.

FTPd offers anonymous users access by giving those clients the same access as a file-sharing Guest account. Anonymous users' passwords are saved to FTPd's log, offering a record of log-ons.

FTPd also offers service to clients using Gopher, a recently introduced FTP-like protocol that is gaining in acceptance because of its speed and flexibility.

Peter Lewis is at 10 Earlston Way, Booragoon, WA, 6154, Australia. Internet: peter@cujo.curtin.edu.au. □

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News Analysis

# Does SNMP really offer simpler management?

*Apple has delivered Mac SNMP agents, but can SNMP deliver for you?*

By Margie Wylie

Apple slipped its new SNMP software on the price list last month so quietly, you'd think it had something to hide. Nothing could be further from the truth.

A real breakthrough for Apple, the SNMP (Simple Network Management Protocol) software for the first time admits Macs to the realm of standards-based management. But like most applications of the standard today, Apple's software offers more promise than immediate awards. And while it lets non-Mac SNMP consoles manage Macs for the first time through TCP/IP, early users said existing proprietary Mac management tools do a better job in AppleTalk networks.

**Public standard, private Mac.** The new software packages — AppleTalk Connection for Macintosh ($39 for one or $199 for 20 users) and TCP/IP Connection for Macintosh ($59 for one or $499 for 20 users) — called agents, feed information about the Macs they are running on to an SNMP application or console.

Much like Apple's Responder, these agents report on system configuration, such as the version of system software and amount of RAM, and on network traffic. Other vendors can also add extensions to the agents through an application programming interface.

Two additional applications, TCP/IP Administration for Macintosh and AppleTalk Administration for Macintosh, both priced at $199, let administrators control which Macs will be managed together. Apple does not offer an SNMP console and does not plan to do so, according to company officials.

**A plank between platforms.** TCP/IP Connection for Macintosh makes it possible for popular Unix-based SNMP console applications to gather hardware, operating system, AppleTalk and TCP/IP information from Macs running the MacTCP protocol stack. "What we were really trying to accomplish was getting Macs to fit into existing management systems," said Dana Harrison, product line manager for AppleTalk.

Apple has tested its agent with major consoles such as Hewlett-Packard Co.'s HP OpenView, Sun Microsystems Inc.'s SunNet Manager and IBM Corp.'s NetView 6000. However, managers used to the slick graphical interfaces of these consoles won't enjoy their benefits when using the Mac agents.

Like many agents that offer specialized information, Apple's cannot use the standard MIB (Management Information Base) specified in SNMP (see story below). So managers have to recompile the Macintosh MIB and then scroll through the text of the MIB to issue an information request, an option that while not elegant, is functional.

**AppleTalk alternatives.** While SNMP agents might be big news at those sites where managing a mixed bag of Macs and other computers falls to one person or department, sites where the AppleTalk network is administered separately are less impressed.

"We have a lot of other applications that give us the same kind of information," said Marcello Vergara, network technician at Payless Cashways Inc., a Kansas City, Mo.-based chain of building-materials outlets and lumberyards.

Vergara said that he already uses an array of applications that offer more-sophisticated agents and better agent distribution and let him control some aspects of his network.

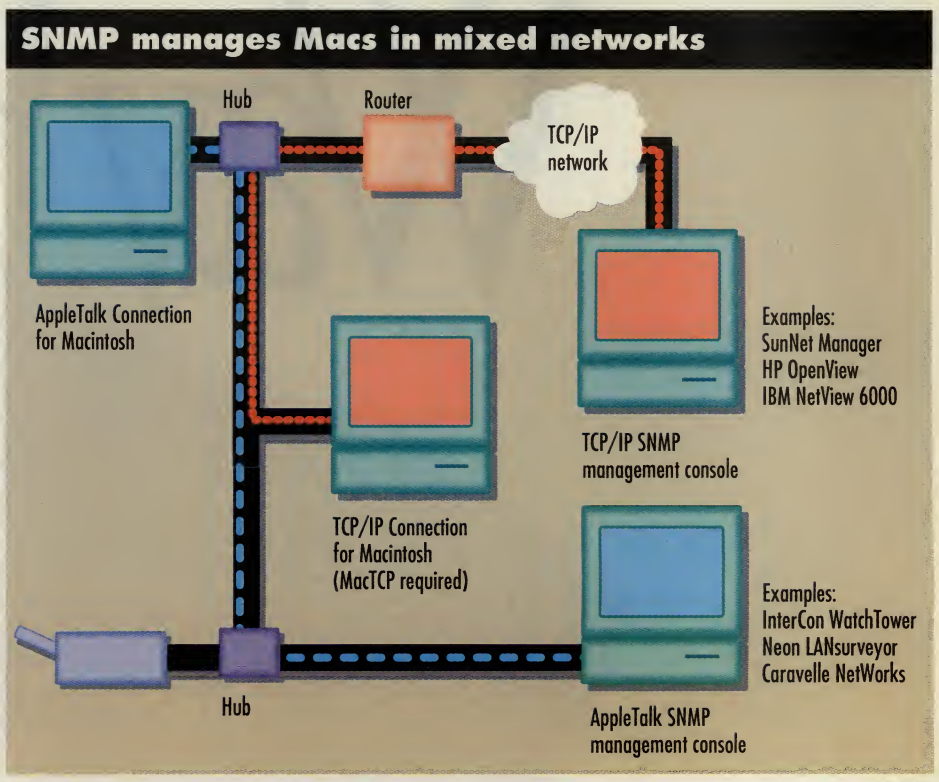
For instance, many proprietary applications will let users not only collect information about a router's performance but also control the device. Like other SNMP agent makers, Apple won't allow managers to change Mac configurations, such as turning virtual memory on or off, from an SNMP console because SNMP has no built-in security. The SNMP Version 2 specification, due this year, will offer authentication and encryption. Apple and other vendors, however, don't expect SNMP Version 2 products for another two years.

So it's understandable that few vendors have followed Apple into the SNMP realm. There are only two AppleTalk-based SNMP consoles thus far, Neon Software Inc.'s LANsurveyor and InterCon Systems Corp.'s WatchTower, while Caravelle Networks Inc. and Dayna Communications Inc. will soon add support to their management products. None of the leading vendors of SNMP consoles has said it will add AppleTalk support, according to Apple.

Another minus is that third-party vendors who could add the most to Mac SNMP management through extensions just don't seem interested. Those that make network hardware that runs on the Mac, such as Ethernet network card maker Dayna, understand the value of SNMP and are developing agents as quickly as possible. But applications makers such as CE Software Inc., whose popular QuickMail server might benefit from SNMP management, are not actively working on SNMP support, according to the company.

**Other kettles of fish.** Then there are those who think Apple's efforts are entirely misdirected at the desktop. They said the company should have first developed SNMP agents for more critical network components, such as its printers, AppleShare servers and Apple Internet Router. Apple said that router and server agents are under development, while the printer agents are under consideration.

Apple admits it has a long way to go when it comes to SNMP management, but it has also taken a giant step in the right direction — the direction of standards. □



NEVIN BERGER

## A little history on SNMP: The who, how and where

Looking at SNMP solely from the Macintosh point of view is like critiquing a waltz by listening only to the tubas: While the rhythm is unmistakable, the full impact of the music is lost.

Likewise, while SNMP (Simple Network Management Protocol) has some intrinsic value for Mac networks alone, most of the protocol's appeal lies in its ability to draw different network voices under the watchful eye of one management console.

In determining how valuable SNMP can be to you, it helps to understand where it came from, how it works and who is using SNMP today.

SNMP was originally developed in the late 1980s as a method for managing routers connected to the Internet.

By early 1990, SNMP was hailed as a de facto standard, and support for the protocol, from both vendors and users, has grown steadily since.

SNMP is made up of three parts that can be compared to an orchestra: a management console (the conductor) asks agents (the instrumentalists) to play a certain part of a score, called an MIB (Management Information Base), at the console's signal. The console might ask a router agent how many errors it has detected. If the agent has a "bad packet" field in its MIB database, it will check that field and report the number to the console application.

SNMP has been adapted to run on several different transport protocols, including Novell Inc.'s IPX (Internetwork Packet Exchange) and AppleTalk, but the most powerful and popular console software still runs on Unix workstations using TCP/IP.

Because of SNMP's poor security, however, most vendors won't allow agents to execute any control functions, such as resetting a router port, for fear that any errant conductor armed with an SNMP baton could control the network.

Also, many vendors extend the standard MIB to include custom statistics and controls. These "private" MIBs usually don't work well, or sometimes at all, with a generic console, defeating the purpose of the standard.

— By Margie Wylie

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The GatorBox EX is easy to configure and manage from any Macintosh on the network, thanks to our GatorKeeper™ software. And, along with customer support that is second to none, it provides the kind of reliability, performance and functionality you have grown to expect from Cayman Systems.

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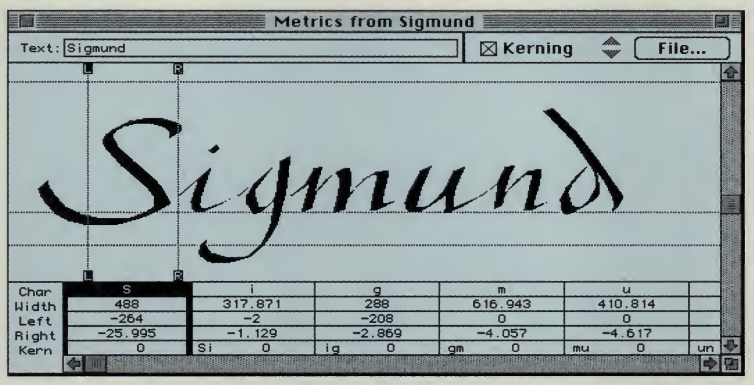
# Fontographer 4.0: Not just for pros

## *Update eases novices into type-design ABCs*

**By Kirsten L. Parkinson**

Boston — Altsys Corp. will put a few new twists on font creation and manipulation when it ships Fontographer 4.0 in June.

Unveiled at Seybold Seminars 93 here last week, the new version of the $495 program adds interface enhancements and a host of new features designed to lower the learning curve for novice users.




**Judy Sutcliffe of The Electronic Typographer used Fontographer 4.0's advanced mode to define metric information when she designed this font.**

Enhancements include:

▸ **Advanced and beginning modes.** Version 4.0 offers experienced users and beginners separate methods for implementing a number of features.

For example, users will be able to adjust metrics information such as spacing and kerning by simply dragging characters or entering precise numerical values into a spreadsheet.

▸ **Automatic spacing.** Fontographer 4.0 automatically sets spacing for a newly created type design. Users will be able to create tables defining spacing information for groups of similarly shaped letters.

Like previous versions, the program will also let users adjust spacing numerically or by tweaking the placement of characters manually.

▸ **Edit in preview.** Users will be able to see Bezier points and edit characters in the preview window as well as the outline view.

▸ **Automatic path smoothing.** A Clean Up Paths feature will automatically replace Bezier points on a drawn path to conform to PostScript rules.

*See Fontographer, Page 26*

# LED-based Coolscan scanner takes heat off 35mm pricing

**By Matthew Rothenberg**

Boston — Nikon Inc. last week delivered Coolscan, a 24-bit-color film scanner designed to fit into users' Macs as well as their budgets.

The device, which shipped at Seybold Seminars 93 here, is available in a $2,195 configuration that can be installed internally in Macs with removable-media drive bays as well as a $2,495 external version with a separate power supply.

Coolscan captures eight bits each of RGB (red, green, blue) information per pixel in one pass from 35mm slides and negatives. It supports a maximum resolution of 2,700 dpi and can capture a 1,024-by-1,024-pixel image in about one minute, 40 seconds, Nikon said.

Coolscan gets its name from new proprietary LED-based CCD (charge-coupled device) technology that generates far less heat than conventional light sources, Nikon said.

The cold-scanning method improves the color fidelity of scanned images and eliminates the need for a fan, reducing Coolscan's power consumption and noise level, according to the company.

The scanner includes an auto-load and eject mechanism that lets users insert individual slides or a bundled strip-film holder, and it ships with a SCSI interface and cable.

Coolscan comes with a software plug-in for Adobe Photoshop that includes a preview mode and lets users adjust individual RGB channels, brightness and contrast, cropping, gamma curves, scaling, and resolution in 1-dpi increments.

Nikon Inc. is at 1300 Walt Whitman Road, Melville, N.Y. 11747-3064. Phone (516) 547-4355 or (800) 526-4566; fax (516) 547-0305. □

# EfiColor plugs into Photoshop; EFI also serves up fast Fiery RIP

**By Matthew Rothenberg**

Boston — Electronics for Imaging Inc. last week added Adobe Photoshop to its color-management palette when it unveiled a version of its EfiColor software tailored to the popular image-editing program.

The company introduced EfiColor for Adobe Photoshop — Core Pack at Seybold Seminars 93 here and also announced a fast new addition to its Fiery color-server line.

▸ **EfiColor for Adobe Photoshop — Core Pack,** to ship next month for $199, comprises a set of color-separation tables that appear in the Preferences file of Photoshop 2.0.1 or 2.5. The tables override Photoshop's color-conversion technology to control transformations among RGB (red, green, blue), CIE LAB and CMYK (cyan, magenta, yellow, black) color spaces.

EfiColor for Adobe Photoshop — Core Pack will come with profiles for 10 popular color output devices from companies such as Hewlett-Packard Co., QMS Inc. and Eastman Kodak Co. The tables match those that ship with versions of EfiColor included in EFI's Cachet program and the upcoming QuarkXPress 3.2, ensuring consistent color among these applications. An additional 15 tables are available from EFI's EfiColor Profile Library (see MacWEEK, Sept. 21, 1992), which now supports Photoshop.

▸ **Fiery 200i** is a $37,500 version of EFI's hardware-based Adobe PostScript Level 2 RIP (raster image processor) that supports Canon CLC, Kodak ColorEdge and Agfa XC305 color copiers. The device is based on a 33-MHz MIPS R3500 RISC processor running 128 Mbytes of RAM and includes a 486 chip that controls I/O, networking and spooling. It can rasterize tabloid-size, continuous-tone or halftone PostScript, TIFF or Encapsulated PostScript files in 24-bit color at a resolution of 400 dpi.

Electronics for Imaging Inc. is at 2855 Campus Drive, San Mateo, Calif. 94403. Phone (415) 286-8600; fax (415) 286-8686. □

# Mac video editing goes on-line at NAB show

## *Broadcasters to see ImMIX, Avid apps*

**By Erik Holsinger**

Las Vegas — Macintosh video vendors are lining up to show their latest nonlinear on-line editing systems at the National Association of Broadcasters show here this week.

▸ **ImMIX** will ship its $38,500 Video Cube and $51,500 Video Cube Plus nonlinear on-line systems.

The Video Cube includes a Macintosh IIvx; two 13-inch monitors and speakers; cable hookups; and the Media Processor, a stand-alone device that contains Discrete Wavelet Transform (DWT) technology, the system's proprietary compression and decompression firmware.

The system can record up to one hour of video and two hours of CD-quality audio to a $9,000, 3.7-Gbyte hard disk drive array, which is available exclusively from ImMIX.

The Video Cube Plus features a Quadra 800 and two 19-inch displays.

Because the Video Cube uses DWT technology instead of JPEG (Joint Photographic Experts Group) compression, it is capable of recording and playing back NTSC video at rates of 30 frames per second and 60 fields per second, ImMIX said.

Most current JPEG editing systems record only one field per frame, resulting in reduced image quality, according to the company.

▸ **Avid Technology Inc.** will announce an on-line version of its Media Composer system (see MacWEEK, Oct. 26, 1992).

The $88,900 Media Composer 8000 uses new JPEG-based video-acceleration chips from C-Cube Microsystems of Milpitas, Calif., to play back video at 30 frames per second and 60 fields per second.

According to the company, the Media Composer 8000 will be available this fall.

ImMIX is at P.O. Box 2980, Grass Valley, Calif. 95945. Phone (916) 272-9800; fax (916) 272-9801.

Avid Technology Inc. is at Metropolitan Technology Park, 1 Park West, Tewksbury, Mass. 01876. Phone (508) 640-6789; fax (508) 640-1366. □

**The ImMIX Video Cube is a complete on-line video-editing package that uses a Mac IIvx as its front end. It is the first Mac-based nonlinear editing system available that can record and play back video at 30 frames per second and 60 fields per second.**

# IT DOESN'T TAKE A ROCKET SCIENTIST TO FIGURE OUT WHICH 24-BIT COLOR GRAPHICS CARDS ARE THE FASTEST.

**MacWEEK** Reprinted From January 13, 1992

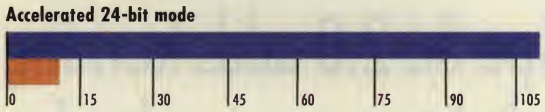
BENCHMARKS

**Hydra composite tests**
(Results in ticks; lower is better)

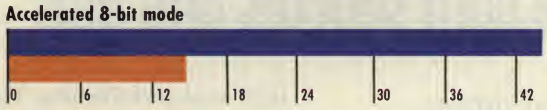
RasterOps 24XLi
SuperMac Thunder/24

**Unaccelerated 24-bit mode**

**Accelerated 24-bit mode**




**Accelerated 8-bit mode**




*All tests were run on a Mac IIfx under System 7.0.1 with 20 Mbytes of RAM and with 32-bit addressing on. Hydra times are in ticks (1/60th of a second).*

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Reprinted From MACWORLD
February 1993

MW LAB **Gauging Video Speed**

**REAL-WORLD TESTS**

In our real-world tests, the size of the monitor dramatically affects performance for line scrolls: bigger monitors are slower. However, bigger monitors can have an advantage for page scrolls, where all the data on the new page is moved onto the screen in one step. Scrolls are good tests of actual performance because they are common tasks and because they cause the Mac to redraw a range of objects, from text to graphics.

**LOW-LEVEL QUICKDRAW TESTS**

Low-level tests of QuickDraw command processing show theoretical best performance. The Basic Commands group includes QuickDraw commands that all vendors accelerate. Radius and SuperMac accelerate some other commands, but our tests show that this does not change these boards' performance.

| | Vertical Scroll (in seconds) | Horizontal Scroll (in seconds) | Page Scroll (in seconds) | All Commands (speed compared to Apple 8•24) | Basic Commands (speed compared to Apple 8•24) |
|---|---|---|---|---|---|
| | Average results for a series of up and down scrolls (one line at a time) in Excel and Word documents. | Average results for a series of left and right scrolls (one column at a time) in Excel documents. | Average results for a series of up and down scrolls (one screen at a time) in Word documents. | Relative performance in processing all 118 QuickDraw commands, using the industry-standard Hydra benchmark. | Relative performance in processing 25 common QuickDraw commands, using the industry-standard Hydra benchmark. |
| With 19-inch Monitors | | | | | |
| SuperMac Thunder/24 | 27.9 | 26.5 | 7.8 | 3390% | 890% |
| SuperMac Spectrum/24 PDQ Plus | 37.1 | 30.8 | 8.0 | 1670% | 510% |
| SuperMac Spectrum/24 Series III* | 54.2 | 40.7 | 8.7 | 710% | 280% |
| Radius PrecisionColor 24Xk | 61.9 | 84.7 | 14.3 | 600% | 270% |
| RasterOps 24XLI | 74.2 | 59.3 | 15.3 | 380% | 180% |
| Radius PrecisionColor 24X | 62.9 | 85.5 | 14.3 | 600% | 270% |
| With $499 piggyback board installed | Shorter bars are better. | Shorter bars are better. | Shorter bars are better. | Longer bars are better. | Longer bars are better. |

Products are ranked in overall performance order, from fastest to slowest, within each monitor size category. The best in each category is indicated in red.

Copyright © 1993 International Data Group. All Rights Reserved.

MacUser **Figure 1: Speed Results**

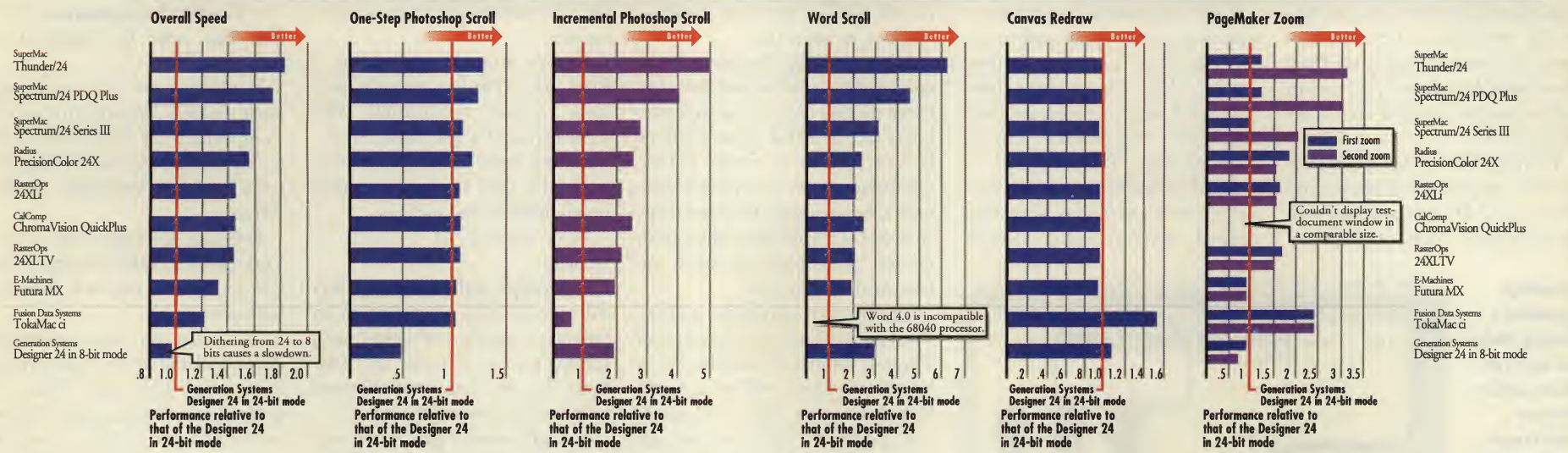


**Figure 1:**
To find out if an accelerated-video card can improve the performance of some popular applications, we performed a suite of real-world tests. We ran all tests on the same Mac IIci connected to the same monitor. We compared the results with those of a Generation Systems Designer 24 unaccelerated-video card in 24-bit mode. We also subjected the Designer 24 to the same tests in 8-bit mode and repeated the tests with a Fusion Data Systems TokaMac ci to see the effect of CPU acceleration.

**Overall Speed:**
The SuperMac Thunder/24 and Spectrum/24 PDQ Plus were fastest overall, almost doubling the speed of the Designer 24 unaccelerated-video card in 24-bit mode.

**One-Step Photoshop Scroll:**
Many users of 24-bit color frequently use Photoshop, so we scrolled through some 24-bit Photoshop images to see if the accelerated-video cards could beat our control product. The Thunder/24 was 25 percent faster than the unaccelerated-video card, and the TokaMac ci CPU accelerator offered no improvement at all.

**Incremental Photoshop Scroll:**
In the incremental scroll, SuperMac's Thunder/24 was five times as fast as the unaccelerated-video card. The TokaMac ci was actually 40 percent slower.

**Word Scroll:**
To see if Word users stand to gain anything from video acceleration, we scrolled through a ten-page text document and found that the SuperMac Thunder/24 was more than six times as fast as the Designer 24. The SuperMac Spectrum/24 PDQ Plus came in a close second, and all the other cards were about twice as fast as the unaccelerated card. As 24-bit color seems a waste for Word users, we ran the same test on the Designer 24 in 8-bit mode and found that it was nearly three times as fast as in 24-bit mode, beating the majority of the accelerated-24-bit cards. We could not run the test with the TokaMac ci, because Word 4.0 is incompatible with the TokaMac ci's 68040 processor.

**Canvas Redraw:**
We were surprised to find that the accelerated-video cards did nothing to speed up a Canvas redraw. The one product that really helped in this task was the TokaMac ci, providing that this task was primarily a compute-intensive one, a task for which video accelerators are not well suited.

**PageMaker Zoom:**
Finally, we zoomed out to a 100-percent view from a 400-percent view of a PageMaker document consisting of text and a 24-bit-color image. We then repeated the same test to see if the cards were caching any of the video data. All the accelerated-video cards, with the exception of the Radius PrecisionColor 24X and the two RasterOps cards, performed the second zoom much faster than they did the first. The Designer 24 card was slower in 8-bit mode than it was in 24-bit mode because the 24-bit graphic had to be dithered for the 8-bit display.

Reprinted From May 1992

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The Hydra QuickDraw™ performance test has become the standard for evaluating the speed of 24-bit color graphics cards. As you can see, Thunder/24™, Spectrum/24 PDQ™ Plus, and Spectrum/24™ Series III outperform all the other 24-bit color graphics cards on the market.

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# Incubator warms to TrueType GX

## *Update will support new Apple technology*

**By Kirsten L. Parkinson**

Boston — With its eye on the upcoming release of Apple's QuickDraw GX, Type Solutions Inc. last week unveiled a new version of its Incubator software that supports TrueType GX fonts.

Incubator GX, introduced at Seybold Seminars 93 here, will let users import a Type 1 or TrueType font and turn it into a one-, two- or three-axis TrueType GX font.

Users will be able to define the extent to which attributes such as weight or width can be adjusted when a typeface is saved in this format. When the new font is selected in a QuickDraw GX-savvy application, users will be able to manipulate the axes within the limits set in Incubator GX, Type Solutions said.

Incubator GX will offer all the features of the company's Incubator Pro application, which lets users create new TrueType and Type 1 fonts by adjusting features such as color, width, slant and x-height (see MacWEEK, Nov. 23, 1992).

"If you're drawing a multiple-axis family, there's an extreme amount of work involved," said Matthew Carter, principal of Carter & Cone Type Inc., a type-design company in Cambridge, Mass. "Incubator's value for me is that it gives me a snapshot of what these typefaces will look like, and then in the production process it gives me a great deal of help. If I wanted to develop a new face in GX, I would definitely use it."

Incubator GX is due by late summer for $695. Upgrade pricing has not been determined. The company said it will also continue to offer the $129.95 Incubator Pro.

QuickDraw GX, an object-based graphics architecture that will offer typographical manipulation, a variety of sophisticated graphics effects and a new printing architecture is due later this year, according to Apple.

Type Solutions Inc. is at 91 Plaistow Road, P.O. Box 1227, Plaistow, N.H. 03865-1227. Phone (603) 382-6400; fax (603) 382-4839. □

**With StrataType 3d 2.0, users can apply an unlimited number of light sources (lower left). Users can also import PICT files as custom textures or backgrounds.**

# StrataType 3d 2.0 adds kerning, multiple light sources and gels

## *Strata scales down cost of type application*

**By Neil McManus**

St. George, Utah — Strata Inc. this week will release StrataType 3d 2.0, an upgrade that adds multiple light sources, kerning and lighting gels.

Strata's program now carries a $199 price, $96 less than the previous version. Compatible with TrueType and Type 1 fonts, StrataType lets users extrude characters into 3-D, then render them with bevels, lighting and surfaces.

New features of Version 2.0 include:

- **Multiple light sources.** Users will now be able to work with an unlimited number of lights, with varying intensities, colors and positions. The previous version allowed only one light per rendering.
- **Light-source gels.** Users will be able to enhance lights with gels, or masks, to create special effects. Version 2.0 comes with preset gels, such as spots, sunrise and sunset washes, window panes, and vertical blinds. Custom gels can be created from PICT files.
- **Improved performance.** The new version redraws 25 percent to 300 percent faster than its predecessor, Strata said.
- **Kerning.** Users will now be able to adjust the spacing between two letters. The previous version let users adjust letter spacing only over an entire logo.
- **Custom backgrounds.** PICT files can now be imported as backgrounds.

In addition, the new version supports Apple's WorldScript extensions, which let users work with multiple languages and writing systems without switching system software.

Beta-user Rochelle Eber, a New York-based graphic designer, said she appreciates the new version's light-source gels.

"You can do some incredible effects with the window and vertical-blind gels," Eber said. "Also, it's great having multiple lights. Before, you would put a light in front of a logo, but it wouldn't light up the side planes."

Upgrades to Version 2.0 are $29.

Strata Inc. is at 2 W. St. George Blvd., Ancestor Square, Suite 2100, St. George, Utah 84770. Phone (801) 628-5218; fax (801) 628-9756. □

# Working Model knows physics of 2-D images

**By April Streeter**

San Francisco — It may lack the sophisticated graphics tools to create the next Ren and Stimpy cartoon, but a new Mac program from Knowledge Revolution promises to help animators put their characters into motion.

Working Model, due this month for $995, assigns laws of physics and motion to 2-D objects drawn with the program's tools or imported from CAD programs in DXF (Drawing Interchange File) format.

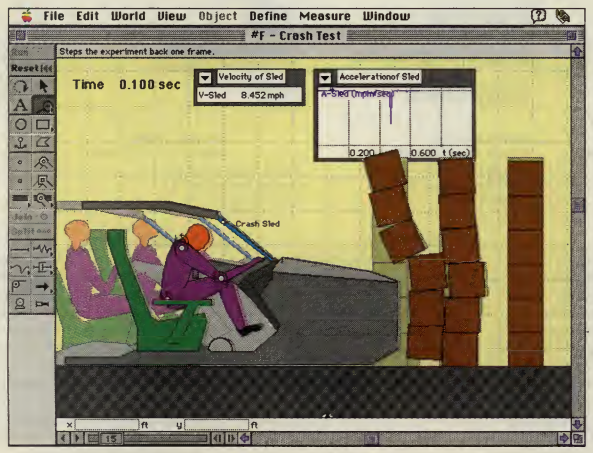
Users can manipulate parameters such as gravity or apply mathematical equations to help simulate motion. After objects have been assembled and parameters assigned, simulation "experiments" can be activated using a Run command.

Finished simulations, which consist of a series of objects along with defined motion paths, can be exported to 3-D animation programs such as Macromedia Three-D and used as the basic building blocks of an animation.

A Smart Editor also lets users set up complex mathematical links between moving objects in a sequence. Joints can be added at intersections between objects to create realistic simulations that employ reverse kinematics. For example, if the user drags an image of a hand across the screen, the rest of the body will follow the hand in moving forward.

The program exports files in DXF, PICT, QuickTime and Macromedia Three-D formats. Knowledge Revolution said filters will be available later this year for other 3-D animation programs, such as Specular International Ltd.'s Infini-D, Strata Inc.'s StrataVision 3d and Macromedia Director.

Knowledge Revolution is at 15 Brush Place, San Francisco, Calif. 94103. Phone (415) 553-8153; fax (415) 553-8012. □




**Knowledge Revolution's Working Model lets users run motion simulations and export results to animation programs such as Macromedia Three-D.**

## Fontographer

*From Page 24*

Other new features will include floating tool palettes, a Multigon tool, direct import of Encapsulated PostScript files and support for non-PostScript printers.

"The most impressive thing about Fontographer 4.0 is that all along the functional front there's been depth and value added," said David Berlow, president of The Font Bureau of Boston. "For example, most people don't appreciate that designers work not only with the black spaces but also with the white spaces.

"Fontographer 4.0 brings greater flexibility with the white spaces. It lets you create spacing for similar types of letters. You can make a relationship between them, and if you change one of them, they all change," Berlow said.

Upgrades from any previous version of Fontographer will be $99; users who bought Fontographer 3.5 after April 1 can upgrade free.

Altsys Corp. is at 269 W. Renner Road, Richardson, Texas 75080. Phone (214) 680-2060; fax (214) 680-0537. □

# Pantone's ColorUP makes color presentable

**By Lisa Picarille**

Carlstadt, N.J. — Pantone Inc. is now shipping ColorUP, a utility that helps business users ensure their presentations and reports are color-coordinated.

The $99.95 product, announced three months ago (see MacWEEK, Jan. 11), includes more than 200 color palettes created by professional designers.

Each palette offers up to 16 colors that users can assign to specific presentation elements, such as title bars, subheads and bullets.

"This is a safe way for people to use color," said Bill Flynn, an analyst with BIS Strategic Decisions Inc. of Norwell, Mass. "Right now, color is hit-or-miss. Just because something works well on screen doesn't mean it will look good when it comes out of the printer. ColorUP ensures it does."

ColorUP palettes can be exported for use in most Mac graphics packages, including Adobe Illustrator, Aldus FreeHand and Persuasion, and Microsoft PowerPoint. Users can preview palettes before applying them to presentations.

ColorUP also includes the ColorUP Explorer, an electronic encyclopedia of color terms, tips and information. The interactive reference material gives visual demonstrations of color concepts such as dithering.

Pantone Inc. is at 590 Commerce Blvd., Carlstadt, N.J. 07072-3098. Phone (201) 935-5500 or (800) 222-1149; fax (201) 896-0242. □

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*...anjet IIc ...0 dpi*

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*La Cie Silverscanner II—133 line screen, factory default settings.*

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News Analysis

# Speedy PostScript printers spur publishing-on-demand

*Using a variety of resources allows users to quickly get what they need.*

**By Anita Malnig and Karen Houghton**

Information Mapping Inc. USA goes into Fortune 1,000 companies to help them boost performance, optimize work flow and improve efficiency. To do this, the company uses a variety of print material, books, worksheets and handouts, much of it customized to the client's needs.

"In August 1992," said Information Mapping President Carol Vallone, "we began looking at improving our own work flow and how we could meet customer requirements." The company, based in Waltham, Mass., was already using Macs to produce camera-ready copy. But the cost of offset printing, storage of materials printed six months ahead and shipping led to what Vallone described as "erratic cash flow." Additionally, courses with already-printed materials often became obsolete, thus forcing them to entirely discard some materials.

Enter Woburn, Mass.-based Ameriscribe Data Resources Inc., the high-tech electronic printing branch of New York-based Ameriscribe Management Services Inc., which since 1989 has been offering "on-demand printing."

"What I call it," said Bill O'Brien, ADR national publishing consultant, "is printing just as many documents as you need, documents that need to be updated constantly."

**Tools of the trade.** The current procedure of printing- or publishing-on-demand, or just-in-time printing as some call it, is geared specifically for print runs of less than 1,000 copies of primarily text material, sometimes including black-and-white line art. The key to this process right now is high-speed PostScript printers such as Xerox Corp.'s DocuTech 135.

This massive $230,000 laser device, first introduced in 1990, can print 135 11-by-17-inch or 8.5-by-11-inch pages per minute at 600 dpi and accepts PostScript files. It resides on a network and can collate and bind printed pages. Xerox's DocuTech 90 is a 600-dpi, 92-ppm laser device that prints on 8.5-by-11-inch paper and lists for $193,000.

Eastman Kodak Co.'s two $190,000 high-speed PostScript printers, the Kodak 1392 models 24 and 44, use an LED imaging device and print 8.5-by-11-inch pages at 92 ppm and 300 dpi. Xerox and Kodak both offer variations of price configurations of the high-speed printers.

According to Bryan Corrigan, senior industry analyst at BIS Strategic Decisions Inc. of Norwell, Mass., since last year, the number of 80- to 119-ppm PostScript printers used specifically for on-demand printing applications has doubled to 20 percent of the market share. This number is expected to grow to account for 50 percent of all high-speed PostScript printers sold by 1996, he said.

**Fostering partnerships.** The collaboration between IMI and ADR works thus: IMI sends its Mac Microsoft Word documents, which might include some Claris Corp. MacDraw line drawings saved as PostScript files, on high-density disks to ADR. ADR, which has already received a job order from IMI, loads the files into a Mac SE/30 on the network, and the file proceeds into the DocuTech's queue. Within 24 to 72 hours the materials are printed, collated and bound, and ADR ships the materials to the site where the course is being taught.

One of the United States' largest printers, R.R. Donnelley & Sons Co., has a "Books on Demand" facility based in Harrisonburg, Va. According to Mark Fleming, manager of demand services business development, "It is one of a worldwide network of on-demand production operations combining printing with other services, such as maintaining a database of publishers' information, helping customers develop a library of scanned or PostScript files, and directly fulfilling orders to the end users."

The Harrisonburg facility includes six Sun workstations, two of which are configured as servers with 11 Gbytes of total transient storage. Several Quadras, IBM PCs and compatibles, and assorted peripherals enable Donnelley to take PostScript files from any medium: floppy disk, cartridge, magneto-optical disks or tape. Ethernet ties it all together with either of the Kodak 1392 Model 24 printers.

The networked high-speed printers are combined with print servers running software that handles job queueing and job compiling (printing multiple files or chapters to build a single document), and contain fonts and the RIP (raster image processor). The facility includes short-run binding and finishing.

The Donnelley group, working in partnership with publishers, receives PostScript files, or the group itself will scan in the publisher's hard copy to produce electronic scan files. Most of the files Donnelley receives are produced on Unix machines. Its desktop system includes Macs, IBM PCs and compatibles, and Unix machines. Donnelley uses Information Presentation Technologies Inc.'s UShare software on its servers to ensure easy file viewing and sharing regardless of the originating platform.

The files are stored in PostScript or compressed bit-map format on a print server, ready to print. Donnelley stores libraries of some clients' files off-line on tape or on optical disks. Donnelley also maintains a Unix-based database of all the library items.

With documents anywhere from several hundred to 1,000 pages long, Donnelley keeps the Kodak 1392s running as much as possible for cost-effective operation. As part of the "Books On Demand" system, Kodak modified the 1392 RIPs so Donnelley's Sun servers can rasterize the books off-line, thus keeping a constant stream of pages feeding into the printers' pipelines.

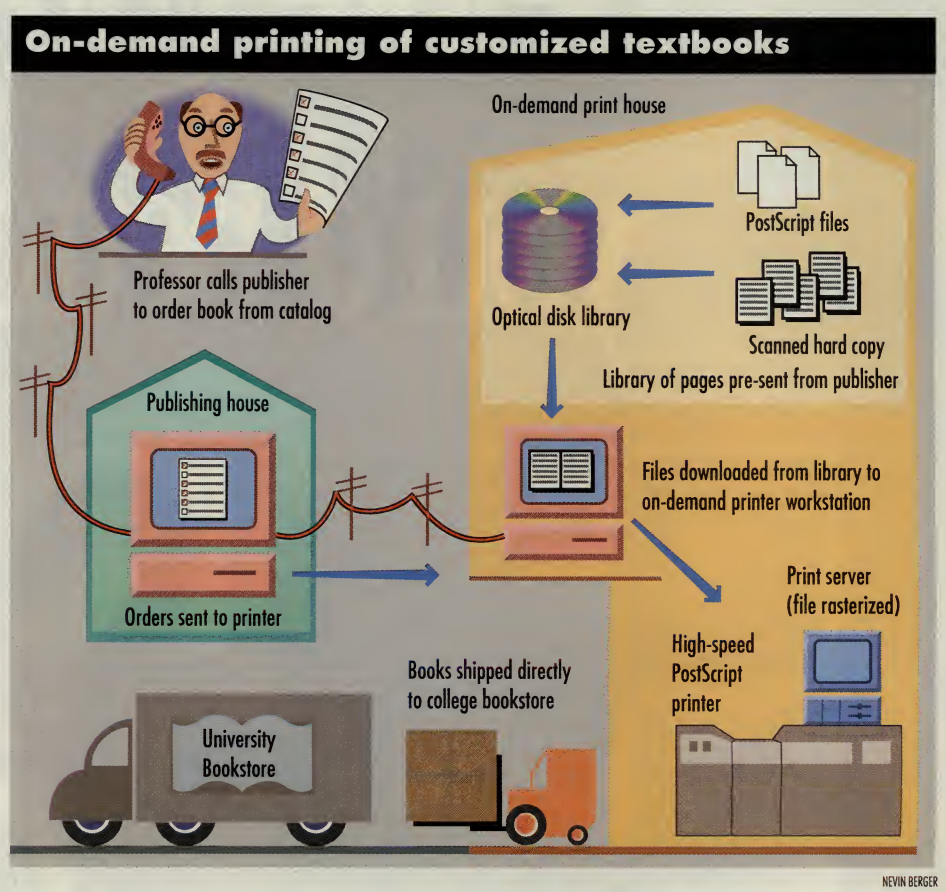
**An academic setting.** A Donnelley client making good use of on-demand services is Primis, which is part of the college division of McGraw-Hill Book Co. in New York.

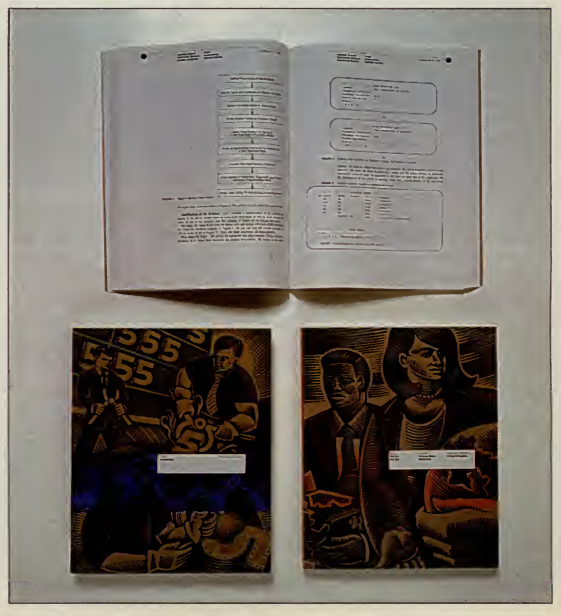
Professors can look through a McGraw-Hill catalog and order the journal excerpts, articles and reviews pertinent to a particular discipline. They then get a bound copy that includes these materials, a table of contents, an index and a unique ISDN number. If the professor approves the publication, the book is produced in precise quantity and delivered directly to the college bookstore for student purchase.

"Our college division editors determine the content," said Bob Lynch, Primis vice president and director. "They either write it or get rights and permission. We are in an environment to include local material."

**The technical process.** McGraw-Hill works in Mac, DOS and Unix environments, saving all files as PostScript. Donnelley maintains a duplicate library of Primis publications and book chapters in

*See On demand, Page 30*



**Below are finished ancillary textbooks published by Primis and Donnelley. At the top are two pages from an engineering book. At the bottom is an accounting text (left) and a marketing text.**

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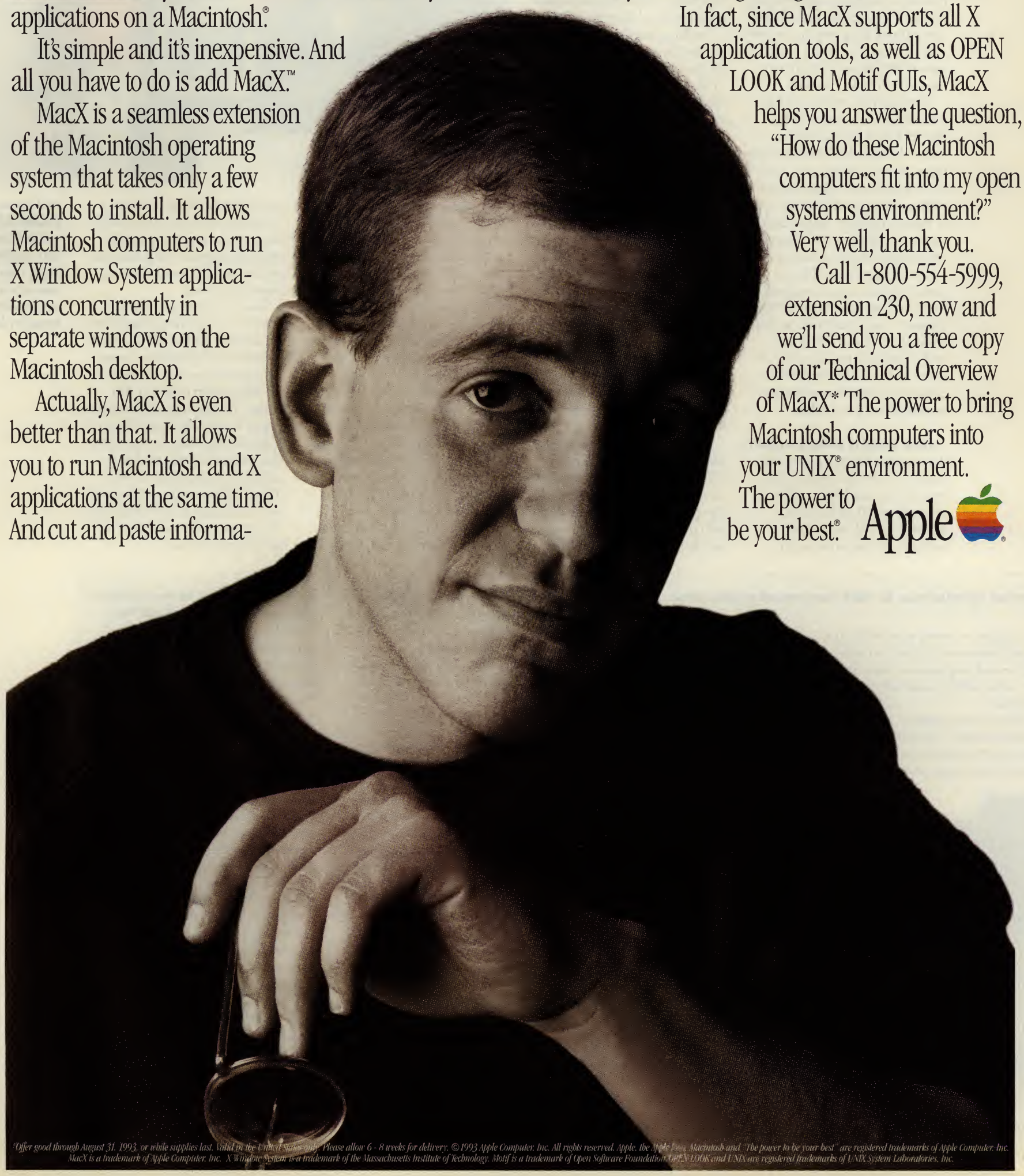

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## On demand

*From Page 28*

PostScript (stored in Harrisonburg and updated periodically by McGraw-Hill). Primis book orders are sent electronically from McGraw-Hill directly to Harrisonburg. Donnelley pulls chapters together from its duplicate library, renumbers the pages, and generates a table of contents and index for the custom book using proprietary software developed by Kodak as part of a joint effort between Kodak and Donnelley for McGraw-Hill.

If a chapter or article needs further editing after it arrives at the printer, Primis must send a new chapter because the PostScript file at that point is uneditable. John Conley, vice president of demand print custom printing said, "You can add or subtract chapters, but you can't change the chapter itself." Update cycles often come in by modem.

According to Gerald Harper, senior systems engineer at Donnelley: "Everyone benefits from Primis. Students' costs of textbooks are kept down; the professor orders texts with chapters in the exact order of the course's syllabus, the publisher cuts down on warehouse inventory, and the author gets royalties."

**How good is what you get?** According to Harper, quality has improved from the printer's first use of the Kodak 1392 in 1989, although at 300 dpi he doesn't believe the 1392 can do tints, halftones or offer offset quality. Nevertheless, he said, "[the quality] is certainly appropriate for many book applications."

Donnelley's Fleming said, "In our customers' markets, the quality is better than the quality of the products we've replaced." In the custom textbook area, the alternative to electronic custom books is duplicated anthologies and course packs produced in a copy shop.

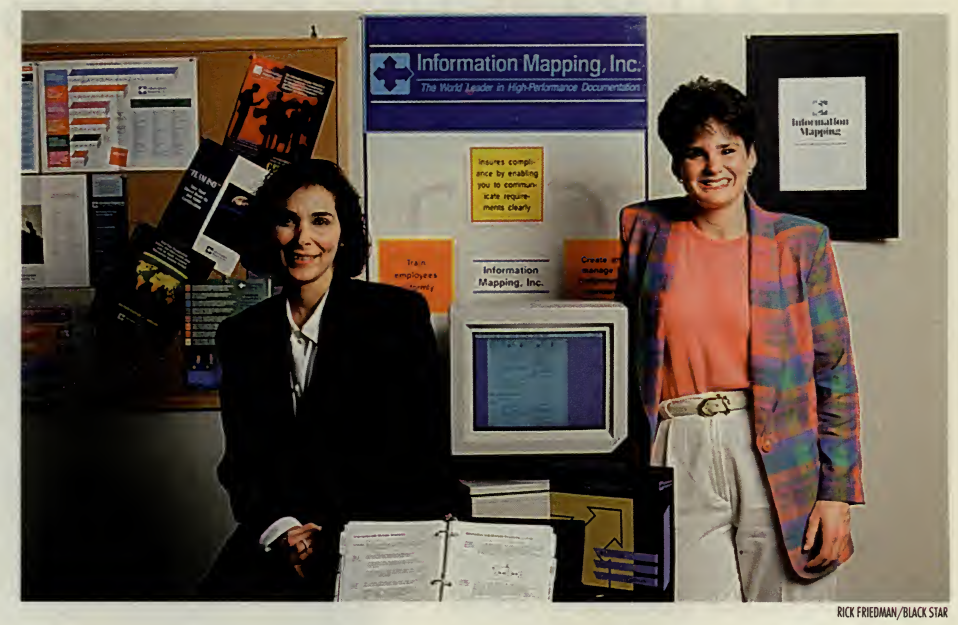
Les Krzyzanowski, president of Crestec Los Angeles Inc., a full-service on-demand printer, agreed. "You can't control the consistent tone of black on press as well as you can with the DocuTech," he said (see story below).

He also pointed to a brochure Crestec produced that used low-resolution photographs. "If you design for [what the machine is capable of]," he said, "you can produce nice pieces."

A Kodak technician works full-time at Donnelley's Harrisonburg plant. At Crestec, a Xerox technician comes to the plant twice a week to service the DocuTechs.

**So what does it cost?** "The expense is worth it," said Craig Jilk, production manager at West Publishing Inc. in Eaton, Minn., of the $200,000 DocuTechs.

West's on-demand operation is similar in process to McGraw-Hill's. West, however, concentrates on ancillary legal material for college professors. The shop is set up with computers of all varieties to handle files from diverse clients.




RICK FRIEDMAN/BLACK STAR

**Carol Vallone, IMI president (left), and Carol Carse, R&D coordinator, display some of the company's products produced on demand by ADR.**

Mac PostScript files make their way to the DocuTech on West's token-ring network.

"We've had a tremendous increase in business [since bringing in the DocuTech]; we've increased our impressions on press by about 60 million sheets per year," Jilk said.

The printers are not the only ones who see cost benefits. IMI's Carol Carse, R&D coordinator, said the company saw an initial savings of nearly $8,000. "The cost of typesetting our materials from September 1991 to January 1992 was $133,350." With on-demand printing, she said, that same volume of printing cost close to $125,000.

While Carse admitted that these cost savings may seem minimal at the outset, "I feel there are equally important nonmonetary benefits to on-demand printing," she said. These benefits include original quality printing, fast turnaround, and decreased inventory and obsolescence.

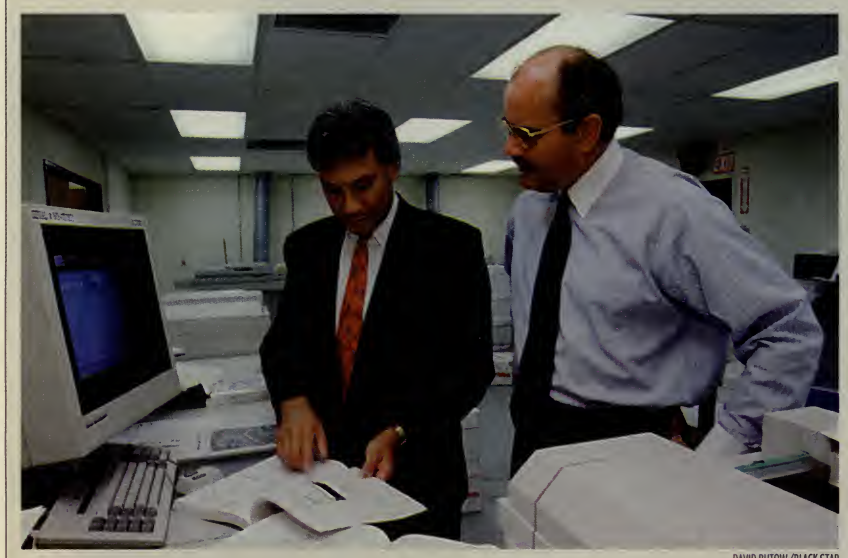
George Gilliam, supervisor of technical publications at Fort Worth, Texas-based AMR Eagle Inc., home of American Eagle airlines, agreed. "The output is an improvement on the 300-dpi laser output we had before," he said. Gilliam's group uses Frame Technology Corp.'s FrameMaker on the Mac to produce complex technical documents that are output on a local printer's DocuTech. Gilliam sees his savings, as it were, in the quality of the document. "I'm getting better quality for the same money," he said. □

### Crestec specializes in fast document production

Los Angeles — Twenty minutes from Los Angeles International Airport, in a seemingly low-tech neighborhood, lies a one-story white building loaded with high-tech equipment.

With tools that include Mac IIfx machines, Sun SPARCstations, three DocuTech printers from Xerox Corp. and Xerox copiers with a Fiery RIP (raster image processor) from Electronics for Imaging Inc., Crestec Los Angeles Inc. is printing on demand. And, on the side, it continues to assemble film and run a six-color commercial press.

Crestec President Les Krzyzanowski was a commercial printer before his operation was bought by the Japanese-owned Crestec, a "document-engineering" company. This international company specializes in document production, including writing, translating and printing, for largely Japanese-based consumer-electronics and automotive companies.



DAVID BUTOW/BLACK STAR

*Marco Navarro (left) and Les Krzyzanowski of Crestec stand in their printing room.*

Crestec accepts Macintosh, PC and Unix files and also employs its own in-house designers who create original layouts on SPARCstations, Macs and PCs in Frame Technology Corp.'s FrameMaker, the company's standard for writing and layout. Designers create line drawings on Macs in Adobe Illustrator.

Because of its multiplatform environment, "we don't always want PostScript files," said Marco Navarro, Crestec director of marketing for document engineering. Crestec would rather get files in native formats so it has the option of manipulating them before saving them as PostScript.

When a document is ready for printing, it's sent over an Ethernet network and put into a queue to be printed on one of the three DocuTechs. While each of the DocuTechs has its own server — two Suns and one 486 PC — these servers do not store libraries of data. All database and library information is stored off-line on a Xerox Extended Storage Optical system on 650-Mbyte optical disks. Crestec is currently adding a 60-Gbyte on-line optical jukebox system for digital document storage.

While Navarro said the slow economy has been an "enabler" for the on-demand printing process to take hold and "has forced [companies] out of the comfort of large printing," Krzyzanowski countered by saying that, "some still think [on-demand printing] is a 'ghost technology'; it's not fully developed, so the advantages are not clearly evident."

Navarro was able to share some clear evidence, however, when it came to job pricing. A complete 800-page manual for which the client wanted 400 copies would cost $65 apiece printed offset, including pre-press and binding costs, and $29 apiece printed on the DocuTech. At 1,200 copies, the cost is nearly equal for offset or DocuTech printing, Navarro said; however, if you wanted to turn the project around in two days you would have to print on the DocuTech.

Krzyzanowski sees the future of printing tied up with technology like the Xerox DocuTechs. He said the major investment for his company is electronic equipment, including a database server and the database itself, which Xerox is developing with Crestec.

Right now Navarro says Crestec's biggest challenge is getting its sales force beyond the trade print buyer. "We need to get deeper into the [prospective client's] company. Once you get to those people, it happens," he said. — By Anita Malnig

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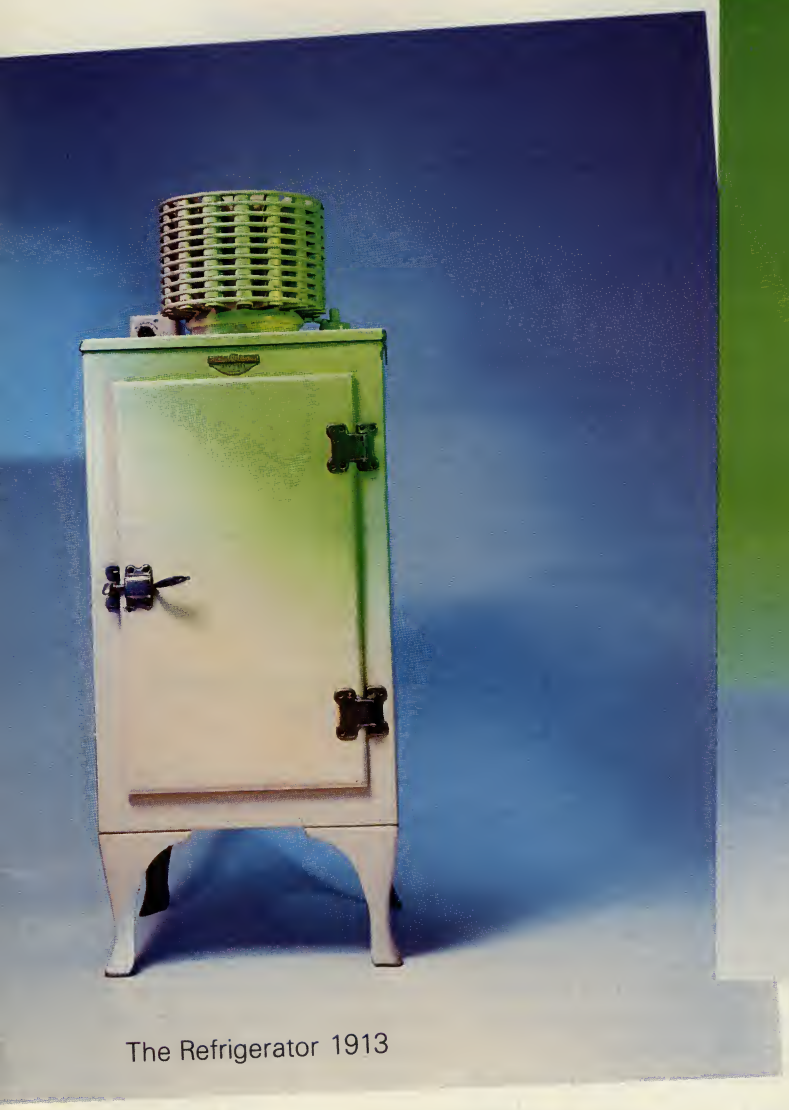

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# BUSINESS WATCH

- Industry news
- Market trends

## Dealers say shortages over now, except PB 180, 230MB drives

By Jon Swartz

San Francisco — The great Mac drought is over, but some dealers claim they're now facing the opposite problem: a flood of excess inventory.

While most Mac models were in short supply a few months ago, nearly all are available now. Only the PowerBook 180 and 230-Mbyte configurations of the Mac IIvx, Centris 610, Centris 650 and Quadra 800 are still in limited supply, according to dealers (see chart).

"The shortages are over, for the most part," said a buyer from a major Mac distributor. "Apple has done a better job of anticipating supply and demand."

Chris Stiger, sales manager for Caber Systems Inc. in Miami, said the supply of Macs has "dramatically improved" over the past month. "The PowerBooks and Quadra 950 are now readily available to us; once, they were almost impossible to get," he said.

An Apple spokeswoman said the company has altered its manufacturing schedule to produce more of its popular models.

Some dealers, however, said they have too much product. They claim Apple "dumped" models on them six weeks ago, when products finally became available but demand had since dropped off.

"A number of dealers were flooded with [Apple] inventory and that created some serious cash-flow problems," said Charlie Hummel, vice president of Allied Crafts Engineering, a West Covina, Calif.-based computer store. "By the time [dealers] got products, customers had already bought other brands."

Several months ago, Apple — deluged by demand for many of its desktop and portable Macs — faced

*See Supply, Page 36*

**Mac availability***

● Available ● Limited ● Very limited

| | |
|---|---|
| **Desktop** | |
| Color Classic | ● |
| Performa 200 | ● |
| Performa 405 | ● |
| Performa 430 | ● |
| Performa 450 | ● |
| Performa 600 | ● |
| Mac LC III | ● |
| Mac IIvx** | ● |
| Centris 610** | ● |
| Centris 650** | ● |
| Quadra 800** | ● |
| Quadra 950 | ● |
| **Mobile** | |
| PowerBook 145 | ● |
| PowerBook 160 | ● |
| PowerBook 165c | ● |
| PowerBook 180 | ● |
| PowerBook Duo 210 | ● |
| PowerBook Duo 230 | ● |

**Projections as of April 13.*
***Model with 230-Mbyte hard drive is in limited supply. Source: Apple dealers.*

## New GSA standards cause uproar

### *Apple one of few vendors complying*

By Lisa Picarille

Washington — Apple is one of the few computer companies willing to comply with a new General Services Administration policy requiring vendors to provide information on the lowest net price ever offered to a customer.

In addition, the government has reserved the right to audit any manufacturer it deems is not in compliance with its policies.

"Apple decided to comply with GSA because it was in the best interest for us in the federal market," said Maryann Karinch, a spokeswoman for Apple's federal division in Reston, Va. "The business interest must have outweighed any problems."

Vendors that previously appeared on the GSA's Multiple Award Schedule have so far refused to comply with the new regulations. Those companies include IBM Corp., Microsoft Corp., Novell Inc., Symantec Corp., Aldus Corp., Lotus Development Corp. and WordPerfect Corp.

The GSA will not issue new schedule contracts or extend current coverage for noncomplying vendors, according to Roy Chisolm, director of the GSA's schedules division.

Despite spending about $1 billion a year on software, the government's buying practices make it like many small customers with small orders.

**The GSA's guidelines**

Vendors must supply the GSA with the following information for their 10 best-selling products:

- Total annual sales to federal government.
- Total annual sales to nongovernment customers at catalog and noncatalog prices.
- Total annual sales.
- Largest discount granted to federal government.
- Largest discount granted to nongovernment customers.
- Documentation and rationale for difference when nongovernment customer received larger discount than what is being offered to GSA.

Product developers claim the government's demands are onerous. Vendors are expected to go through the process of opening up their financial records in order to give the government the lowest possible prices, and for its part, the government does not have to commit to purchasing products in the same large quantities as corporate customers.

"This is a very emotionally charged issue," said M. Dendy Young, president of Falcon Microsystems Inc., Apple's government reseller in Landover, Md. "The government's basic fear is that General Motors [Corp.] is getting a better deal than the government and they don't want to be embarrassed. But at the same time, the moment you mention audit, everyone gets heart palpitations."

Product developers, however,

*See GSA, Page 36*

## Outlook cloudy for big Sun Computer chain

By Lisa Picarille

Carson, Calif. — Sun Computer Inc., a retail chain that is one of the country's largest Apple resellers, is having financial problems after defaulting on a loan because of "cash-flow difficulties."

But David Sun, president and CEO of the company, insists the situation is only temporary and that Sun is not in danger of filing for bankruptcy.

Ironically, the company's financial problems were exacerbated in January by an Apple promotion.

"What happened was we got into a promotion where [Apple] was trying to move Mac IIci [machines] and other systems," Sun said. "We took advantage of that [promotion] ... but it put us in a cash-flow problem because we are still waiting to get rebates from Apple."

The cash-flow problem reportedly resulted in Sun missing several loan payments, causing it to default on a loan and leading a creditor to threaten to bring Sun to court. David Sun declined to discuss details.

In addition, the company reportedly has experienced delays in getting new Apple systems and has lost accounts because of Apple's restructuring of its education distribution channel, according to sources.

"The Apple education accreditation is not the issue, since it only started this month," Sun said. "The issue is a backlog in some places, and to some degree it is a cash-flow issue."

An Apple spokeswoman said the computer maker's relationship with Sun remains "business as usual."

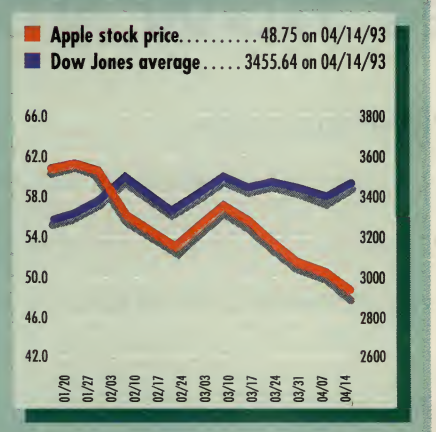
Although sources said the com-

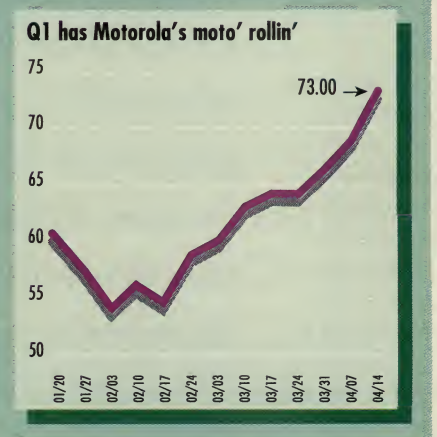
*See Sun, Page 36*

**StockWatch**

| | 04.14.93 CLOSE | WEEKLY % CHANGE |
|---|---|---|
| **Apple** | 48.75 | -3.47 |
| SOFTWARE DEVELOPERS | | |
| Adobe | 44.75 | 10.84 |
| Aldus | 18.00 | 2.86 |
| Caere | 7.63 | -4.69 |
| CE Software | 3.50 | -6.67 |
| Microsoft | 89.00 | -1.39 |
| Novell | 33.25 | 3.91 |
| Symantec | 13.75 | 1.85 |
| PERIPHERALS VENDORS | | |
| CMS | 2.13 | -5.56 |
| HP | 74.50 | 1.02 |
| Mass Micro | 0.28 | 0.00 |
| QMS | 16.75 | 12.61 |
| Radius | 3.69 | -7.80 |
| RasterOps | 4.69 | -3.84 |
| Sigma | 5.50 | -12.00 |
| SuperMac | 16.50 | 6.45 |
| STORAGE | | |
| Conner | 12.88 | -0.96 |
| Maxtor | 7.13 | -3.39 |
| Quantum | 12.00 | -4.95 |
| Seagate | 13.75 | -5.98 |
| SyQuest | 13.00 | 0.00 |
| INDUSTRY INDICATORS | | |
| DEC | 41.63 | -4.31 |
| IBM | 48.88 | -6.46 |
| Motorola | 73.00 | 6.96 |
| Sun | 29.38 | 0.00 |
| Dow Jones | 3455.64 | 1.73 |

*Compiled by Nordby International Inc.*




*Motorola Inc.'s sixth consecutive quarter of sales growth translated into a healthy jump in the company's stock last week. The Schaumburg, Ill.-based company's stock rose 7 percent to close at $73 per share.*

*The chip maker said its first-quarter profits skyrocketed 63 percent to $204 million.*

*Meanwhile, overall sales increased 19 percent to $3.63 billion (see story, Page 37).*

If the stories you've heard about Thunder/24™ led you to believe it's the fastest color graphics card, the results of a new, independent lab test will leave you thunderstruck.

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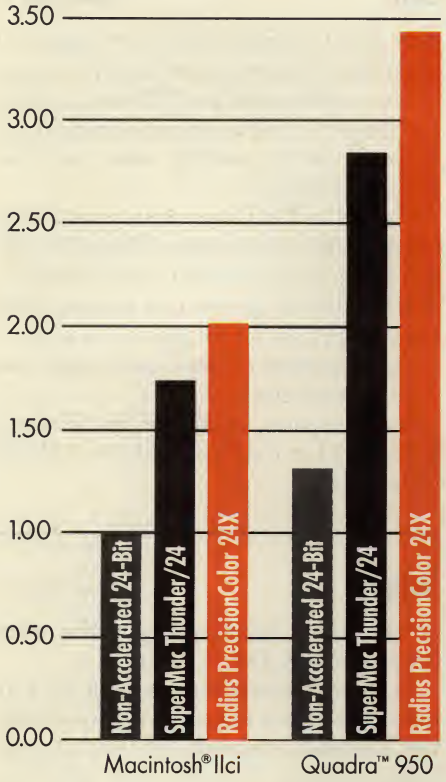

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# ChipSoft set to acquire MECA

**By Lisa Picarille**

San Diego — As the tax season wound down to its annual climax last week, the leader in the tax-preparation software market, ChipSoft Inc., announced plans to acquire its chief rival in the field, MECA Software Inc.

Under terms of the $58 million merger, MECA will become a wholly owned subsidiary of ChipSoft but remain based in Fairfield, Conn.

ChipSoft will add MECA's Mac, DOS and Windows versions of TaxCut and Andrew Tobias' Managing Your Money to its current suite of products, which includes MacInTax, the leading Mac tax-preparation application.

ChipSoft, based here, reported fiscal year 1992 sales of $50.5 million. It has dominated the Mac tax-preparation software market since it acquired Softview Inc. and its MacInTax line in 1991. MECA's fiscal 1992 sales were $21 million.

Sales of personal-finance software rose 82 percent last year, making it is the fastest-growing category in the $5.75 billion U.S. software market, according to the Software Publishers Association of Washington, D.C. □

## GSA

*From Page 34*

claim GSA schedule contracts should be with resellers since the data the government requires is not typically kept by developers.

"Resellers provided GSA with more than enough information to make fair and responsible decisions," said Doug Miller, government affairs representative for the Software Publishers Association, an industry organization based in Washington, D.C. "There is no legitimate business reason for vendors to have this information on hand. It's absolutely absurd."

Others agreed. "Why don't they earn the money the taxpayers pay them — do it like corporate buyers and negotiate?"said a source at one of the vendors that has yet to comply. "They don't need to tie up companies' financial departments for weeks to get boatloads of records."

Industry observers said this new procedure will end up costing everyone more money.

"The most important consequence is that the government will end up paying more money for products from the companies that are not on the schedule because they will have to buy those products on the open market," Miller said. □

## Sun

*From Page 34*

pany may be forced to file for Chapter 11 bankruptcy protection, Sun claims his company is not at that point yet. "We have not filed for Chapter 11 and we are still actively trying to work out outstanding issues with our financing," he said.

Formed in 1980, the privately held chain recently reported revenues of about $106 million for its fiscal year 1993 ended March 31. The company has grown at an average annual rate of 50 percent for the past several years.

Eighty percent of Sun's sales come from Apple-related sales.

Sun Computer, based here, has 13 stores, including 11 in California and two in Washington state. □

## Supply

*From Page 34*

an estimated $1 billion backlog of Mac orders (see MacWEEK, Dec. 7, 1992).

Industry observers said that while the February introduction of nearly a dozen new Mac CPUs initially compounded backlog problems, a number of developments since then have eased the crunch on shortages.

- Apple has ramped up production of most components, although a shortage of active-matrix screens continues to hamper the company's ability to deliver the PowerBook 180, and the supply of 230-Mbyte drive mechanisms hasn't kept up with demand.
- Demand among users has tapered off from the traditionally frenetic fourth quarter, when large businesses are making their final purchasing plans for the fiscal year and consumers are Christmas shopping.
- Apple-authorized dealers are now offering DOS clones and other manufacturers' models in addition to Macs. "Our [Hewlett-Packard] sales have done nicely. We're very happy with their price points," Hummel said. "With Apple, our margins are razor thin and shrinking." □

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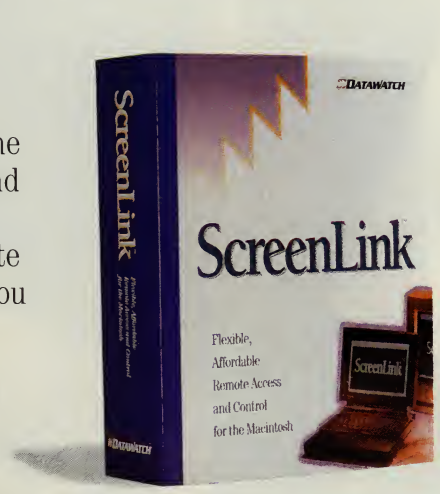


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## Business BRIEFS

**RasterOps names new president**

Santa Clara, Calif. — RasterOps Corp., which last week said it expects to post a third straight quarter of flat sales, has appointed Paul Smith to the newly created position of president and chief operating officer.

Smith previously held management positions at Martin Marietta Corp. and Texas Instruments Inc. He will report to RasterOps CEO Kieth Sorenson.

**Symantec exec bails out**

Cupertino, Calif. — Rod Turner, Symantec Corp.'s executive vice president and general manager of the Peter Norton Group, has resigned to become president and CEO of Knowledge Adventure, an educational software company in La Crescenta, Calif., next month.

During his eight years at Symantec, Turner was executive vice president of marketing and sales for domestic and international markets as well as executive vice president and general manager for the data-management and project-management groups.

**Apple USA tackles Windows**

Campbell, Calif. — Apple USA is creating a new distribution channel to sell Apple imaging peripherals to Windows users.

Apple Authorized Peripheral Dealers (AAPDs) will sell and support Apple's new Windows-optimized products.

Products to be marketed through the program include Apple's LaserWriter Pro 600 for Windows, the Personal LaserWriter NTR for Windows and Apple's OneScanner for Windows. The LaserWriter Select 310 for Windows will be available via AAPDs this month.

Apple USA over the next year plans to work with Ingram Micro Inc., Merisel Inc. and Tech Data Corp. to recruit resellers for the program.

# Motorola earnings up across board

By Ian G. Jacobs

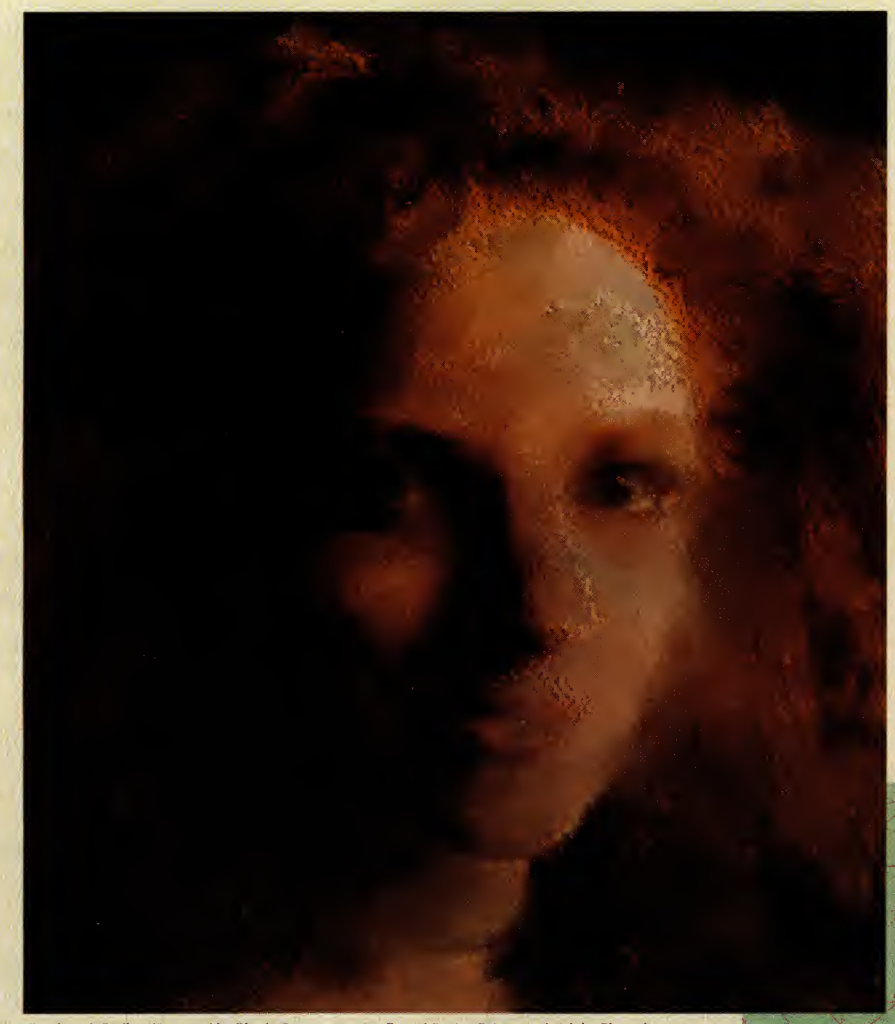
Schaumburg, Ill. — Buoyed by a 20 percent rise in sales of its microprocessor chips, Motorola Inc. last week posted a 63 percent increase in first-quarter earnings.

Earnings were $204 million, up from $125 million in the same quarter last year. This was the sixth consecutive quarterly jump for the maker of the 68000 series chips used in the Mac.

Sales of semiconductor chips rose to $1.28 billion, accounting for about one-third of Motorola's overall revenues of $3.63 billion.

In addition to the computer chips, the company's cellular phones and communications products also posted strong gains. Motorola's cellular-phone hardware business jumped 33 percent to $1.06 billion. Its pager and two-way radio sales rose 19 percent to $1.09 billion.

Intel Corp. saw even larger increases for its first quarter. The Santa Clara, Calif.-based semiconductor manufacturer posted revenues of more than $2 billion, an increase of 63 percent from the same quarter a year ago. Earnings were $548 million, a jump of nearly 200 percent over its first quarter last year. □

"Rembrandt Redhead" created by Rhoda Grossman, using Fractal Design Painter and Adobe Photoshop. Original photography by Joel Meyerowitz.

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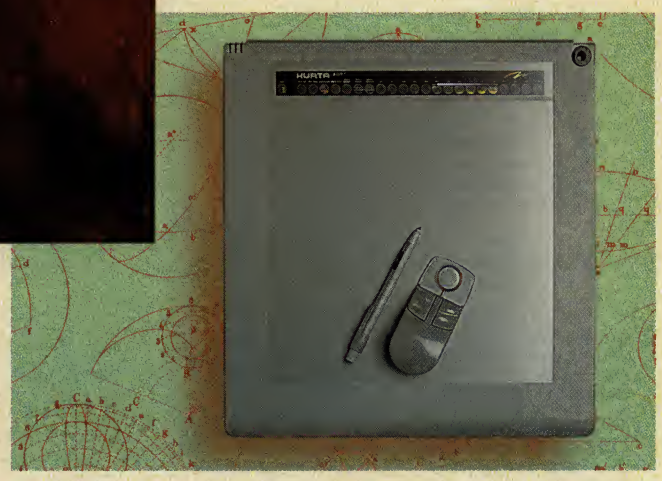

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BPA

EDITORIAL

# Shrink-wrap VITAL

VITAL, Apple's desktop-oriented enterprise-integration framework, commanded more time on stage than any other topic at last week's Apple Enterprise Computing Conference. That's appropriate: VITAL, or Virtually Integrated Technical Architecture Lifecycle, should be of interest to any Mac manager whose responsibilities cover other platforms and whose users need better access to host-based data. What it promises is something any information-systems manager could use: a way to maintain legacy systems and provide compelling decision-support data to graphical user interface desktops without killing your in-house programmers.

But at the end of the day, Apple had little to offer attendees with visions of VITAL dancing in their eyes. Apple's explanations of the framework still have a highly abstract, often metaphorical quality, in part because important pieces of software necessary for VITAL do not exist and may not ever exist in commercial form. And VITAL Services Mapping, a guide Apple distributed in draft form at the conference, is a bizarre hodgepodge of programs that "fit the framework" but "are not VITAL services in the strict sense"; in fact, most aren't VITAL services in *any* sense we could discern.

As proof-of-concept, Apple showed a mostly Mac VITAL setup based on Andyne Computing Ltd.'s GQL, Oracle Corp.'s database, AOCE (Apple Open Collaboration Environment) and key VITAL services written by Apple. Everything worked, but no one in the audience could have come away from the demonstration with any hope of building a similar system back home.

Apple should create a small but functioning VITAL package so its large customers can test the framework's concepts in a real-world setting. A usable version of last week's demo setup would be a good start: Even though it wouldn't reflect the platform-independent scope Apple wants the framework to have, a Mac-based VITAL is better than none.

If Apple cannot ship to its customers the components needed to reproduce even a small-scale demo, then it should stay out of the enterprise business. □

**Commentary**

# Taking control of clone standards is its own reward

JEAN-LOUIS GASSÉE

Sometimes Microsoft Corp. is like those people who, having already acquired almost everything, feel they are left with but two pursuits: keeping it and getting the rest of it.

While there is much discussion of Microsoft's restless watch over its dominions and of its insatiable appetite for new ones, the company's interest in hardware has remained unexamined. It's not clear whether Microsoft's interest in hardware is opportunistic, part of a grand scheme to become a dominant supplier, or yet another strategy to extend its operating systems and applications dominions.

Previous hardware efforts, beginning with SoftCard through current audio products, seem to favor the opportunistic theory. However, recent events suggest a more organized interest in hardware.

Last year, Microsoft heavily courted Apple high-level hardware engineering talent. The last Microsoft developers conference featured discussions of hardware designs. Very recently, Compaq Computer Corp. and Microsoft tied yet another of these "strategic" knots while making passing references to joint support of future hardware products.

Unrelated events or clever strategy?

**Proposing a theory or two.** Microsoft is up front about its interest in tying together home-entertainment devices and personal computers. Doing this will require more than just new "modular" versions of Windows. It will require new, dedicated hardware. It remains to be seen if Microsoft wants to compete against Sony Microsystems Corp. and Matsushita in this market or just extract license fees.

Three forces may have a bearing on what Microsoft is contemplating. First, progress is taxing the aged PC AT clone standard. Second, the evolution of the standard is rudderless, IBM Corp. having abandoned the helm long ago. Finally, the first-tier clone makers dream of regaining some margin advantage against those pesky no-name clone assemblers by somehow taking control of the standard as it evolves.

Microsoft surely invokes the market's invisible hand in its discussions with the Federal Trade Commission but undoubtedly thinks it could write better software if only it controlled the evolution of the hardware standard.

Attempts thus far to evolve the PC AT standard have ranged from weak to ACE-inine. It took several years of dithering for the relatively small improvement of the LocalBus to gain currency. And even though IBM now includes it in its ValuePoint systems, no one controls it. And there's still the annoying problem of razor-thin margins.

**Nothing but a "G" thing?** We're speculating here, but Microsoft can play one of two roles: either as benign facilitator of the invisible hand or as gang leader.

In the benign role, Microsoft can present itself as an honest broker, offering a blueprint for the evolution of the PC AT clone-platform standards that it would support with better system and applications software.

In the second role, Microsoft would offer a small group of elite clone assemblers "protection" from competition in return for their adopting Microsoft's new standard. In this scenario, these assemblers would sacrifice long-term independence for short-term high margins, the term being the duration of the exclusivity clause in the Microsoft contract. But if Microsoft is successful as the leader of this small group, it can be counted on to want to expand it. This will result in Microsoft's reverting to the role of instrument of the invisible hand and licensing all comers.

Either way, there is only one sure winner. □

LETTERS

## We are trained professionals; don't try this upgrade at home

I would like to address some issues raised in Ric Ford's MacInTouch column "Revving up Mac ticker boosts speed, danger" (MacWEEK, April 5). Digital Eclipse Software Inc. sells Mac logic-board upgrades like those described in the story. As the market leader in this field, we have acquired quite a bit of knowledge and experience in this area.

The column is correct in stating that a logic-board upgrade is risky when performed by ordinary users. However, when done professionally, the procedure is entirely safe and has several important benefits for the user.

First, boosting the CPU speed cannot be performed willy-nilly on any Mac model. Rather, it relies on the knowledge that most of the parts of the machine were designed to run at a faster speed. For example, if you look inside the IIsi, you discover that many of the components, including the critical Apple custom application-specific integrated circuit chips, are identical to those used in the IIci, a 25-MHz machine. This means that most of the IIsi is guaranteed to work at 25 MHz. Digital Eclipse upgrades only Macs such as the PowerBook 140 and 160 and the IIsi whose components are designed to run at a faster speed.

Second, logic-board components that may not operate at a faster speed can be tested and/or replaced by qualified technicians. At Digital Eclipse we test the CPU and FPU (floating-point unit) of every Mac we upgrade, and we replace chips that do not meet specifications for faster speed. Because of the delicate surface-mount soldering required, replacing these parts should be done only by experienced technicians with professional soldering equipment. We also replace any RAM that is not specified to operate at the faster speed. By adding a heat sink to the CPU chip, we lower its operating temperature below what it was before the upgrade, thus extending its expected life span.

Finally, upgrading the logic board has several important benefits for the user. It provides an upgrade path for machines such as the PowerBook 140 and 160 that otherwise cannot be upgraded. On single-slot Macs such as the IIsi, it allows the user to upgrade without filling the expansion slot with an accelerator card. It gives the user a new logic board warranty on an otherwise out-of-warranty Mac. It provides a 100 percent software-compatible upgrade solution. Last but not least, the upgrade costs less than an equivalent accelerator card (if one exists) and has a better price/performance ratio.

In short, when done professionally, upgrading the logic board is a great way to upgrade a Mac for a reasonable price.

*John M. Neil, chief technical officer*
*Digital Eclipse Software Inc.*
*Emeryville, Calif.*

## Mac IIvx RAM is expandable with third-party SIMMs

I believe we can shed some light on the IIvx memory questions raised by Barry Myers in his letter "Customer judges RAM scam worthy of complaint to FTC" (MacWEEK, April 5).

It is definitely possible to equip a Mac IIvx with 16-Mbyte SIMMs. We demonstrated IIvx Macs equipped with 68 Mbytes of RAM at last November's Comdex/Fall '92 in Las Vegas. The IIvx had four 16-Mbyte SIMMs, which we manufacture, along with the 4 Mbytes of RAM that Apple solders on the logic board. The IIvx was equipped with an Apple internal CD-ROM drive. This contradicts the rumor that the drive unit is incompatible with the 16-Mbyte SIMMs.

Although Apple does not offer 16-Mbyte SIMMs, they are available from third-party vendors such as ourselves.

We offer a free RAM configuration guide that lists every possible memory configuration for all Macs, from the Plus through the Quadra 800. The guide is free and may be requested by calling (800) 678-3726.

*Roger Kasten Jr.*
*Director of product development*
*Newer Technology, Wichita, Kan.*

## Helios Lantest benchmarks Unix AppleTalk servers best

The story "Servers to speed to CeBIT debut" (MacWEEK, March 8) was accompanied by several charts that are ambiguous and possibly incorrect. I submit that printing such charts without explanation is confusing.

I believe it's in the best interest of the user community for MacWEEK to provide technically accurate and unambiguous material to help the hundreds of thousands of AppleShare users gain a better understanding of what to expect from high-performance AppleShare server systems. In the future, MacWEEK should provide the associated documentation to define the measures applied in the tests.

MacWEEK should use the free Helios Lantest application to test the Unix-based AppleShare systems on the leading RISC platforms. This tool tests seven key areas of server performance.

I strongly urge MacWEEK to take a leadership role to help add clarity to this complex issue.

*Paul E. Lucero, national sales manager*
*Helios USA, Cupertino, Calif.*

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*Send letters to MacWEEK, 301 Howard St., 15th Floor, San Francisco, Calif. 94105. MCI 323-1203; Internet, letters@macweek.ziff.com; fax (415) 243-3650. Include your name, address and phone number. Letters should not exceed 300 words. We reserve the right to edit for clarity and length.*

**The Mac Manager**

# Managers should discover 'Things That Make Us Smart'

DON CRABB

How often have you reflected on how you and your staff interact with the Mac? How often have you wanted to spend time reflecting on how to really empower your charges with better tools, better systems and better environments? Have you ever wondered just what "better" is in that context?

Whether it's the condition of our environment or not, the lamentable truth is that most of us assume we don't have the time to spend reflecting on these issues. Too many projects have to be done *now*.

Fortunately, there are truly brilliant people out there who have reflected. People who have been kind enough to write down some of their insights and give us a couple of clues how to make sense of our technologically dominated lives and how to improve the technologically dominated lives of those entrusted to our counsel.

One such person is Donald Norman. He's an Apple Fellow — itself an indication of his brilliance — who is also a leading expert on the effective design of technology, a cognitive scientist who knows how to communicate and a reflective thinker of the first order.

Norman has a new book coming out in May, "Things That Make Us Smart" (Addison-Wesley Publishing Co., May 1993, $22.95, hardcover, 240 pages, ISBN 0-201-58129-9), that should be on the must-read list of every Mac manager. Here's why.

**Understanding machines.** Norman's previous books include such seminal titles as "The Design of Everyday Things" and a book of essays, "Turn Signals Are the Facial Expressions of Automobiles." He understands the complex interplay between people and the tools they use, especially computers.

In his new book, Norman examines just exactly how people design the technology that we work with and makes the simple (but often overlooked) case that computers, our most complicated machines, ought to be made to fit our minds, and not the converse.

If software and hardware designers would only keep that gem in their minds as we're pushed into "standardized" interfaces, as if any of us really knows what "standard" a computer interface ought to have. We in the Mac community talk bravely about the Finder being the quintessential graphical user interface. We can even point to some "studies" to prove the point, but we're all dreadfully missing the potential of the human/computer interaction with such hubris.

Norman understands that our computer technology is not neutral. It dominates us. And if the design behind a particular computer technology doesn't really fit the way we think and work, it tends to regiment our thinking and, eventually, it can cause us all to adopt the technology's constructs rather than the technology being conformed to our way of thinking.

**Find the time.** I'd love to go on with this analysis, but I'd never come close to Norman's well-executed arguments. Find the time to read "Things That Make Us Smart" and evaluate how your own interactions with Mac technology have been made to conform to the way of the Mac.

In so doing, you may gain some insights into how you can reverse this trend so that Mac-style empowerment isn't just an advertising catch phrase. □

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# Agent Technology

## The fine line between smart design and intelligent software

ILLUSTRATIONS BY JACK DESROCHER

By Michael Miley

Well-publicized developments in communications, miniaturization, and human-machine interfaces such as pen and voice control are converging to produce new kinds of computers with smarter and more personal behavior. Although much of the focus so far has been on future handheld devices, a good deal of the progress is being charted in the software realm. On Macintosh and other platforms, developers and researchers are working to create "intelligent agents" — software that can learn the habits of a user, receive instructions, and then run off to retrieve or manipulate data.

Sometimes the agent software constitutes nearly an entire operating system, as is the case with the upcoming Telescript from General Magic Inc. of Mountain View, Calif., but in the majority of cases, agents are created for specific domains.

There's no firm consensus on what constitutes an intelligent agent, but it's clear that an agent is not just a well-designed program that assists you in carrying out your task. Watch Me features have long been useful in automating telecommunications sessions, and CAD users delighted when Ashlar Inc.'s Vellum introduced the context-sensitive drawing assistance that has since migrated to so many drawing packages. But those advances lack one or more of the factors necessary to qualify as intelligent agents: autonomous agency, user feedback and conditional intelligence.

Autonomous agency means the user can delegate a task to the program; user feedback means that the agent improves over time based on user responses; and conditional intelligence means that the agent can operate in complex, changing contexts that require decision making.

How do vendors build all this in? They usually don't, settling instead on a subset. Researchers at Apple; the Massachusetts Institute of Technology in Cambridge; Carnegie-Mellon University in Pittsburgh; and elsewhere — as well as software developers in IBM PC and compatible and Mac markets — have nonetheless developed many different types of agents, including some very powerful ones. But competing concepts in rule-based and natural-language systems, knowledge engineering, and machine learning show that there's no fixed consensus on how to build this kind of software. Development teams and researchers find their own ways when it comes to moving intelligent agents from concept to reality.

**Automation and agency.** "To understand what an intelligent agent is, you first have to distinguish agency from intelligence," said Michael Reeds, engineering manager for No Hands Software, developer of a utility called Magnet, which it advertises as the first intelligent agent for the Macintosh. "An agent is something you delegate a task to," Reeds said. "How precisely it does this is where the smarts come in."

A key purpose of agency is to automate repetitive tasks: The agent does tedious, time-consuming work for you. Familiar macro programs, such as QuicKeys from CE Software Inc. or Tempo II Plus from Affinity Microsystems Ltd., can also automate a wide variety of routine and complex tasks. But are they agents?

"We say that QuicKeys is agentlike in that a sequence can be triggered at a time set by the

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## Agents

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user," said Dave Loverink, CE design manager for QuicKeys and ProKey, its PC equivalent. "But we don't really call it an agent system just yet. Future developments will put it more squarely in the agent category."

According to Reeds: "One reason macro programs don't qualify as agents is that they don't work as background tasks. When they execute, they take over your computer. Backgrounding is one aspect of agency."

**Client-server.** Within a client-server framework, automated tasks run on the server — in the background as far as the user is concerned — and several agent programs use a client-server structure.

Apple's upcoming AppleSearch is one. It runs on top of an AppleShare or System 7 file-sharing Mac, indexing word processor documents stored on that machine. Client software lets users create search agents called Reporters, which are stored and run on the AppleSearch server. Reporters can be set up to execute repeatedly at scheduled times and can be modified later by altering keywords and logical operators. Apple has been demonstrating AppleSearch's technology for years as an example of its work in developing intelligent agents. A more advanced product, Hoover from SandPoint Corp., performs a similar set of text-retrieval functions on Lotus Notes servers and on-line databases (see story, next page).

But AppleSearch Reporters, although they are autonomous, do not create themselves, and they don't get smarter or more focused in their searches without your intervention.

**Watching over your shoulder.** Observers argue that agents qualify as "intelligent" only when the software learns from a user's behavior. Software developers have begun work on this feature, which presents one of the most interesting advances in agent development.

While all Mac-based macro programs record and imitate a user-specified range of actions, Key Watch, a PC macro program from Micro Logic Corp., watches keyboard activity and alerts users when a process can be automated. Other developers are working on similar extensions to the standard Watch Me mode.

"We've shown an example of a recorder technology in the next version of Microsoft Word for Windows," said Brian Valentine, director of engineering for workgroup applications at Microsoft Corp. of Redmond, Wash. "Word will watch you and automatically build a custom tool bar for you, based on the way you work."

Eager, a technology under development at Apple, is both a Watch Me recorder and a pattern recognizer that functions within a scripting environment. Eager has been demonstrated running in HyperCard, but its functions could also work under the Mac OS-controlling AppleScript, according to Laura Hamersley, product marketing manager for component technologies at Apple.

But is pattern recognition sufficient to make an autonomous agent intelligent?

**Things change.** The playback of a recorded macro fails when work patterns change. Regardless of whether you've chosen the sequence of actions or the software determines one for you, if you later discover a better way of doing things, you have to go back and discard or edit the sequence. Text-searching products, such as AppleSearch and Hoover, don't use an action-recorder method. With them, you build searches based on keywords, natural-language commands or Boolean logic. But the problem is the same: As your needs and context change, you have to manually alter the search.

Still, "AppleSearch gives you important feedback that you can act on," said Susan Gladwin, product manager for Apple's upcoming information server. "Topics are returned ranked by relevancy with a five-star rating system, and keywords are highlighted, emphasizing the hits. You can cut and paste part or all of a document and turn it into an example for further searches."

Interfaces like this make the editing job easier, but the analysis of your findings in light of the new context is still supplied by you, not the software.

Perhaps, as some researchers argue, agents must always work in a feedback loop with the user. Perhaps even an intelligent

*See Agents, next page*

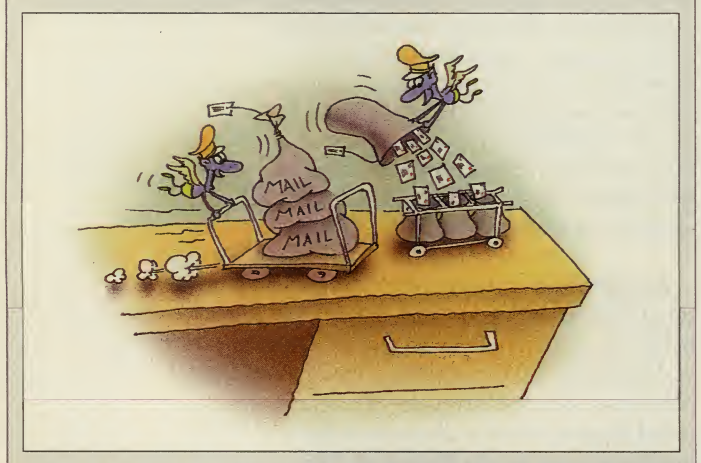
### Apple's agent offerings: AppleSearch now and Eager later

▸ **AppleSearch.** Apple's information server, targeted for a mid-1993 release, will search and retrieve indexed text using a software engine developed by Personal Library Software (and used in its Personal Librarian software).

AppleSearch will rank results by pertinence to the user's query, and agentlike searches can repeatedly scan the available content, automatically translate relevant word processor documents into text via Apple's XTND technology, and send the results back in an electronic "newspaper." The system will be able to handle English-like and Boolean queries and turn successful results into examples for future queries.

▸ **Eager.** A combination action recorder and pattern recognizer, Eager is an agent technology under development for scripting environments. Eager watches you in the background, looks for repetition, then offers to automate actions by generating an editable script.

### BeyondMail plays by rules




Beyond Inc.'s BeyondMail epitomizes the rule-based approach to electronic-mail management. The program runs on DOS and Windows computers connected to Novell Inc.'s Message Handling Service or Banyan Systems Inc.'s VinesMail servers, but the company plans to release a Mac-based version after AOCE (Apple Open Collaboration Environ-ment) ships.

At the heart of BeyondMail is a scripting language that can be used to create workgroup and distributed applications, such as issue tracking or automatic meeting scheduling. Its rules can include When/If/Then controls and Boolean operators to route mail to a designated place when the conditions are met. These semiautonomous rules, when used with BeyondMail Forms Designer, can automate larger information-management routines, including other applications.

### Macros and Magnet

▸ **Macros.** Many different utilities offer automation of repetitive tasks for users. CE Software Inc.'s QuicKeys and Affinity Microsystems Ltd.'s Tempo II Plus can repeat a wide variety of manual operations for Macintosh users and can be triggered to operate at scheduled times. Their agency and intelligence are limited, but complex sequences can be built. On the IBM PC and compatible side, Key Watch from Micro Logic Corp. is a macro utility with a keystroke-pattern detector that notifies you when a typing process can be automated. EasyShare from Adisoft Inc. performs a similar function and also allows you to insert branching control structures.

▸ **Magnet.** Advertised as the "first intelligent agent for Macintosh," No Hands Software's Magnet fits squarely within the autonomous-agent category, although its intelligence is a function of user configuration and its actions are confined to file management. Magnet can work in the background at prearranged times to automate a variety of Finder-oriented tasks. To activate Magnet, you simply identify the files or folders to work with, define what to do with them and when to do it. That can be at a scheduled time, when a disk is mounted in the Finder or when the Mac is idle or about to shut down.

### PageKeeper

Sharing many key concepts from Personal Library Software's engine, Caere Corp.'s PageKeeper does for Windows 3.1 what AppleSearch will do for the Mac, and more. PageKeeper creates a compressed image of both text and image documents, stores them in its database, and then lets you execute searches from anywhere on a network.

The way it searches is simple: You can turn retrieved documents into Agent Documents that locate other documents with similar content. Retrieved documents are sorted into major content areas and weighted for relevancy. PageKeeper includes automatic indexing, scanning and optical character recognition, multi-user access, support for electronic-mail delivery, and document annotation.

## The Maes model: Intelligent, evolving agents and machine learning

Using Macs and Unix systems, Pattie Maes and several graduate-student researchers at the Massachusetts Institute of Technology's Media Laboratory have built prototypical intelligent agents that learn from user actions.

In a scheduling package, the agent learns the habits of the user with respect to calling meetings, rescheduling them and negotiating times. In an electronic-mail application, the agent assists in sorting, collating and saving messages based on the user's habits when working manually. In an information-filtering project, the user has a set of agents to help search and retrieve articles from a gigantic database of Usenet messages, which grows by 300 Mbytes each week.

In each case, the agent is always monitoring the user's behavior. When it notices regularities, the agent offers to automate the perceived pattern for the user. If the user doesn't like the agent's offer, the user can tell the agent why. The rejected agent continues monitoring the user's actions until such time as its predictions improve and the user develops more trust. At that point the user can tell the agent to take over.

When the agent is first set up or when the agent is watching and learning, the user can accelerate training by providing canned examples to augment the agent's record of real activity. Activity is defined in the current MIT prototypes by 40 weighted features specific to the application (E-mail sorting, scheduling and so on) and set up beforehand.

Every so often, the agent runs a statistical-analysis program on the stored examples (optionally at night, since it requires some intense processing) to decide to what degree these features correspond to the action taken by the user. When the agent's knowledge of a repetitive action has risen above a certain threshold of certainty, the agent declares it is confident of its prediction.

Using an artificial-evolution model, implemented as a genetic algorithm, agents can also spawn new generations of agents, which take their parent's place by shedding old knowledge and acquiring new examples, statistical history and user knowledge as they are used.

Maes' model for "learning interface agents" was designed to explore new ways for building agents, born out of dissatisfaction with two other models.

The rule-based approach uses user scripting or programming controls for task-specific information handling. Maes disliked this method because the user has to recognize the opportunity for employing an agent, take the initiative to create one and endow the agent with specific knowledge in an abstract language.

In a knowledge-based approach, an expert compiles a lot of background information, which an agent uses to deduce proper behavior. But this method requires a huge amount of work by the expert, which is not applicable to different types of tasks.

*— By Michael Miley*

### Workgroup systems for the well-heeled

▸ **Edify Electronic Workforce.** Edify Corp.'s PC-based development environment is a system for creating intelligent agents in work-flow applications, such as sales, marketing, human resources, technical support and finance. Edify agents can respond to incoming phone calls, fax, Electronic Data Interchange messages and electronic mail, as well as automate the retrieval and distribution of data to clients.

Edify Express Applications are prepackaged agents (in groups of two to 20) that can be customized via the optional Edify Agent Trainer, which uses icons instead of a traditional programming language.

▸ **SmartStream Decision Support.** This system from Dun & Bradstreet Software is a client-server environment with links to transaction-oriented host databases for the distribution of management information, reports and documents.

The system's internal agents automate work-flow tasks for SmartStream's core applications in financial and management reporting, automation, analysis, and database access. Agents are also used for E-mail filtering.

SmartStream uses a Sybase SQL server for its information storage database, Powersoft Corp.'s PowerBuilder for interface design and Cognos Corp.'s PowerPlay for data analysis. SmartStream is available for Windows, OS/2, VAX VMS and Unix on computers from Hewlett-Packard Co. or Data General Corp.

## Agents

*From previous page*

agent should be only semiautonomous but with the capacity to learn from the user's corrections and additions.

A useful feedback loop necessary to keep agents on track is easy to imagine and hard to implement. Even harder, however, is the creation of agent systems that retain knowledge of your behavior and use it as the basis for future action, but that are flexible enough to evolve over time.

**Rules and knowledge.** When you ask an agent program to learn, you enter the contentious area of artificial intelligence and its offspring. Most agentlike products on the market borrow from the models of rule-based systems and knowledge engineering.

Beyond Inc.'s BeyondMail, for instance, uses a rule-based approach to electronic-mail management, while SandPoint's Hoover combines user-supplied rules and keywords with its own knowledge about the context of the search: which on-line services to log onto, how to get onto them, how to pose queries and so on. AppleSearch and Caere Corp.'s archiving and searching program, PageKeeper, also apply versions of this strategy. And these products, intended for end users, have a well-defined context: the in-house information server. These agents always know where to go to get their data.

When agents know almost everything about their environments, the results are some of the most powerful systems available, such as Dun & Bradstreet Software's SmartStream Decision Support and Edify Corp.'s Edify Electronic Workforce. SmartStream is used for decision support in Dun & Bradstreet's software environment, while Electronic Workforce automates routine work-flow tasks, such as order fulfillment or benefits enrollment. In both cases, agents can be created to filter information or to automate fixed tasks across an enterprise, but they are not end-user tools. They require visual programming on the part of MIS whenever they need to be customized.

Intelligent agents that can be modified only through programming — whether object-oriented, procedural or script-based — are likely to be outside the scope of users' tolerance levels: They simply won't bother to build such agents. Programming and scripting require knowledge, abstraction and foresight. This puts even the most accessible scripting-based agents out of the reach of everyday users.

Assistant Professor Pattie Maes is the local agent expert at MIT's Media Laboratory. In a paper on "Learning Interface Agents" to be delivered at the National Conference on Artificial Intelligence in Washington, D.C., this July, she and graduate student Robyn Kozierok argue that intelligent agents are stuck on the horns of a dilemma almost as old as artificial-intelligence research: Rule-based agent systems "require too much insight,

*See Agents, next page*

### Lotus Notes, on-line databases yield secrets to Hoover

SandPoint Corp.'s Hoover is a powerful information-filtering agent that searches, retrieves and integrates data from multiple sources, including on-line databases; CD-ROMs; and broadcast feeds, such as news wires. Its searches are predefined by SandPoint and must be purchased individually. Customization is a matter of changing search items.

Hoover works on the server for Lotus Notes. Using a request document, users can check off from a list what they need (such as company information, product review, executive biography or newspaper articles), and the request document conducts a search. Searches can be optimized for specific targets or, using an add-on Business Topic Research module, opened up to retrieve new information. Hoover requests can apply Boolean logic and keywords.

Search modules are available for specialized applications and include Electronic Wall Street Journal; Company Profile, for monitoring public and private companies; NewsAlert, for real-time news monitoring; and Legislation Tracking System, for delivering information on pending legislation at state and federal levels.

**Guest editorial by David Nagel**

# Software agents prepare to do their duty

*Think: When were you able to work effectively with a colleague or assistant who was completely autonomous?*

Every so often, in the otherwise smooth evolution of technology, a discontinuity occurs. Progress in creating more powerful hardware and software technologies proceeds to the point where it is possible to deliver a human experience qualitatively different than those before it. We are at such a point today.

The term agent refers to a type of software designed to bring about this kind of qualitative change. Over the next several years, we will come to take for granted the presence and capabilities of agents as part of the user experience of both personal computers and personal digital assistants. Agents will allow us all to be more effective, to be more productive and even to have more fun than we have been able to before.

**Servants.** It is possible to imagine various kinds of agents. Some will act as our assistants; they will help us to do tasks and will protect us from our errors. They will have specific skills to allow us to do things that we don't have the skills to do ourselves.

DAVID NAGEL

For example, one type of agent may understand the complex rules and practices of typography. Another kind of agent may understand the complex algorithms that allow the color appearance of an image on a video display to match the color appearance of the same image rendered on a color printer. The PowerBook on which I am writing this article has yet another kind of agent: one that dutifully beeps whenever I misspell a word. Sometimes it even corrects the errors for me.

**Surrogates.** Other agents will act as our surrogates. These will take our goals and objectives and carry out useful tasks without our intervention.

I spend a great deal of my time finding information. If I could create an agent that "knew" what I wanted to find and I could send this agent, electronically, in my place to find these pieces of information, it would be a great boon to my productivity.

The kinds of agents I have been talking about probably strike you as pretty mundane. By now, and particularly if you read trade or technical periodicals, you may even think that I am stretching the idea of an agent. The emerging popular notion of agents almost always incorporates the idea of an autonomous entity, represented as a talking head. Although such agents will no doubt be created in the future, I believe that such definitions are overly restrictive.

**Smarts.** These preconceptions also lead us to the unrealized world of artificial intelligence. There the notion of an intelligent agent, to whom we can speak as naturally and freely as with a human, is both as central and as distant as it was in the mid-1960s. Back then it was claimed that AI was just around the corner, separated from all of us only by a little government funding.

We *will* want our agents to be capable, trustworthy, adaptive, persistent and probably a little bit — but only a little bit — autonomous. (Think: When were you able to work effectively with a colleague or assistant who was completely autonomous?)

**Semantics.** There doubtless will be great arguments waged over the next decade about whether a new software capability is an agent, whether it represents true intelligence or enough independent action to merit the term. I suspect that in the end many of these arguments will be unproductive. What will matter is whether the agent truly provides a user benefit, such as improved productivity or a more enjoyable, engaging experience.

I am reminded in this of a phrase that a good friend of mine, Earl Wiener of the University of Miami at Coral Gables, Fla., coined years ago when discussing how intelligent the automated systems of a modern aircraft should be made. Earl's comment, which I have never forgotten, was that the best automated systems often were "dumb but dutiful." I suspect that many of our best agents in the future will fit this characteristic. □

---

*David Nagel is senior vice president and general manager of the Advanced Technology Group and Macintosh Software Architecture Division at Apple.*

## Agents

*From previous page*

understanding and effort from the end user," they write, "[but knowledge-based approaches] require huge amounts of work from the knowledge engineer."

Maes' model for machine learning shows promise as a way to change that (see story, previous page).

**A more intelligent agent.** While autonomous software is being used to automate many repetitive tasks, to conduct searches on LAN-based services and on-line databases, and even in decision-support systems, developers have climbed onto just the first rung of the ladder in creating intelligent agents. Maes' model for building agents that learn over time and remember examples of the way a user works indicates that it may never be feasible to delegate a task to your agent and walk away. For an agent to be truly helpful, it may have to keep in touch with the user, checking back periodically to get "advice" or corrections.

Unfortunately, "There are no commercial agents out there with a smart learning loop for validating their assumptions," said Microsoft's Valentine. "But we haven't run out of ideas." □

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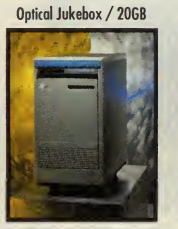

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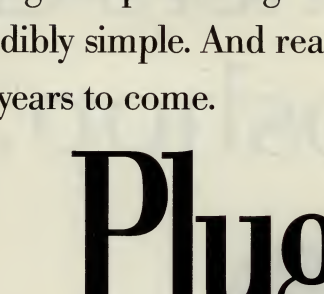

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▸ DoveFax Pro+Voice.
See Page 52.

# Server takes 4D to new dimensions

*Database solution pairs ease, efficiency*

**By Mel Male**

The use of client-server architecture has proved to be an efficient approach for the design of minicomputer- and mainframe-based multi-user databases. 4D Server, ACI US Inc.'s multi-user engine for 4th Dimension 3.0, brings this approach to the leading relational database manager on the Macintosh. With 4D Server, ACI is claiming significant multi-user performance gains over previous versions of 4D.

We looked at 4th Dimension 3.0 in detail last year (see MacWEEK, Dec. 17, 1992), and issues of database design and use with 4D Server are similar to those of 4D. For this review, we wanted to look at 4D Server's performance, setup and maintenance. We tested the performance of 4D Server in a number of configurations at Ziff-Davis Labs in Foster City, Calif., and found that ACI's key claims were true. (See story at right for detailed information on performance-related issues.)

**Basics.** The 4D Server package contains all the software needed for clients as well as for the server, and it includes all of 4D 3.0's database-design capabilities as well. 4D Server is installed as easily as any other Macintosh application and runs over existing AppleTalk networks.

ACI claims that 4D Server can be installed on any Mac computer with a minimum of 1.5 Mbytes of RAM plus 130 Kbytes per connected user, a hard disk, System 6.0.7 or later with ADSP (AppleTalk Data Stream Protocol) installed, or System 7. In reality you will need much more RAM than this — the more the better. In addition, each client requires a minimum of 1.5 Mbytes on the workstation where it will be installed. 4D Server uses AppleTalk network protocols and can operate on LocalTalk, Ethernet or token-ring networks.

**Breaking down the cost.** The cost of 4D Server is based on the maximum number of concurrently connected clients you wish to accommodate. You are permitted to install the 4D Client software (a separate application that arrives with 4D Server) on as many of your computers as you wish, but 4D Server will allow concurrent connections only up to the number authorized by your license. 4D Server lists at $1,495 with a license for three concurrent users; $2,495 for six users; $3,495 for 10 users; and an added $1,000 for each five-user increment, up to 50 users for $11,495. A license for more than 50 users is available for $15,000. Dis-

*See 4D Server, Page 49*

**Contributors**

*Jeff Davis was the project leader for testing 4D Server at Ziff-Davis Labs in Foster City, Calif. Alan Chan and Jim Moratto of the labs worked on the project as technical specialists.*

*We would like to thank Natural Intelligence Inc. of Cambridge, Mass., for its help during the database creation and optimization process.*

**score card**

**4D Server**

**ACI US Inc.**
**Version tested: 1.01**
**List price: $895***
**Overall value** ◆◆◆◆

ACI has astutely combined the efficiencies of a client-server database architecture with the interface efficiencies and economies of the Mac. 4D Server is capable of impressive performance on AppleTalk networks and is a snap to install and administer. Time-sliced multitasking enables 4D Server to handle each client as a set of independent processes and to perform nearly concurrent database operations. Because relatively few of the database's performance-sensitive activities take place on a client's workstation, you don't have to worry about dedicating expensive resources as clients and can instead invest in a high-performance machine. Our only negative comments relate to the lack of built-in backup functionality and ACI's use of a hardware copy-protection device.

**Performance** ◆◆◆◆◆
**Features** ◆◆◆◆
**Ease of use** ◆◆◆◆
**Documentation/support** ◆◆◆◆◆

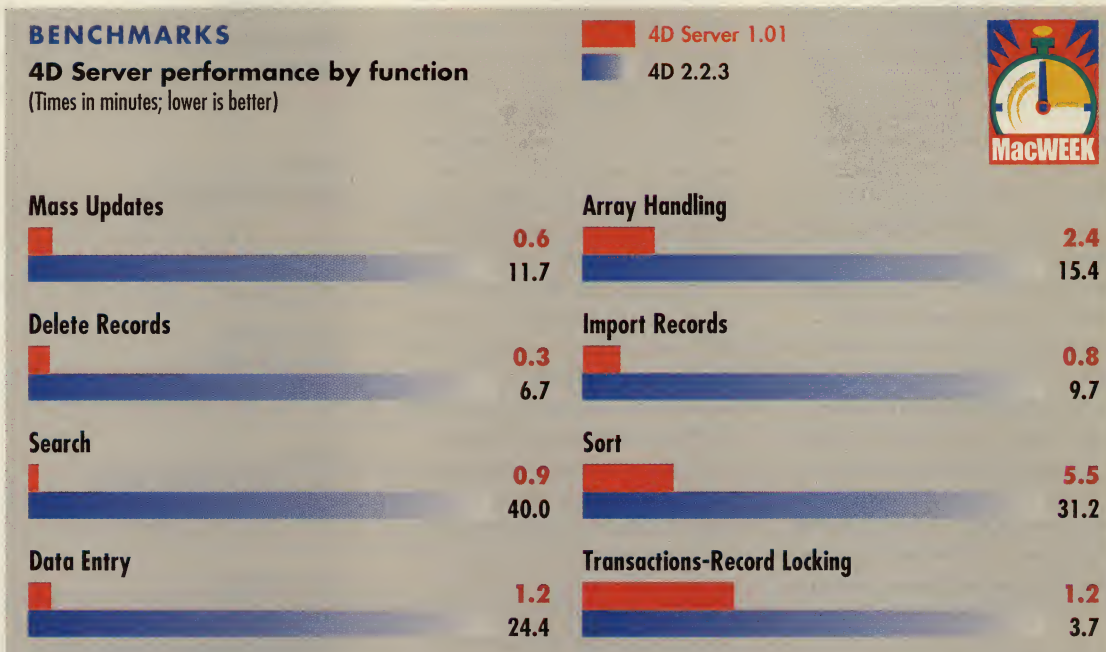
**With a license for three concurrent users, 4D Server is $1,495; $2,495 for six users; $3,495 for 10 users; and an added $1,000 for each five-user increment, up to 50 users for $11,495. A license for more than 50 users is available for $15,000.*

**RATINGS KEY**

◆◆◆◆◆ *Excellent*
◆◆◆◆ *Very good*
◆◆◆ *Good*
◆◆ *Fair*
◆ *Unsatisfactory*

**BENCHMARKS**

**4D Server performance by function**
(Times in minutes; lower is better)




The test modules shown here represent eight key components of multi-user database usage, as determined by MacWEEK and ZD Labs. Each test was performed multiple times and averaged.

- **Mass Updates** applies an identical change to a selection of 300 records.
- **Array Handling** loads field data from 500 records into a string array and then writes the contents of the array back to the selection of records.
- **Delete Records** deletes a selection of 300 records unique to the local client.
- **Import Records** imports 300 records from a tab-delimited text file and includes all fields except the Notes field.
- **Search** includes the results of four indexed-search operations: a search returning a single record, a search returning many records, a search on multiple keys and a search on a related field.
- **Sort** measures sorting performance on a group of 500 and 1,000 records. Three sort tests were performed: on a single indexed key, on two indexed keys and on a related key.
- **Data Entry** selects a set of 75 records, displays 35 of them, adds 25 records through the Add Record command and modifies 10 records.
- **Transactions-Record Locking** is a multi-transaction test that determines how well 4D Server handles multiple requests for the same record. Each client is given an identical list of 15 records to modify; all modified records in the group are locked until the client's transactions are finished.

*Tests were performed on an Ethernet network using a Quadra 950 as a server with 64 Mbytes of RAM and Mac IIci clients with 16 Mbytes of RAM, each running 4D Client 1.01. The test databases used were optimized for performance by ZD Labs (see performance story below for more information) and contained 50,000 records.*

**Performance Issues**

## 4D Server gives impressive show in multi-user network performance

**By Mel Male**

To test 4D Server we emulated a multi-user environment in which a server is required to perform many disparate functions simultaneously for each node. To achieve this, each of our clients was sequenced to loop through our test application's modules in different orders — each client's test loop was offset one module from that of the previous client.

We used appropriate data-analysis techniques to ensure that our results would truly represent overall performance capability and not be unduly distorted by individual functions. Typically, three trials were run for each module. The times for all clients to complete each trial were averaged, then the three trial averages were averaged to provide an overall time for the module. For modules containing multiple tasks, the harmonic mean of each task's performance time was used to obtain an overall performance index for the module. This was done to equalize the contribu-

*See Performance, next page*

## Performance *From previous page*

tion of each task to the module's overall performance.

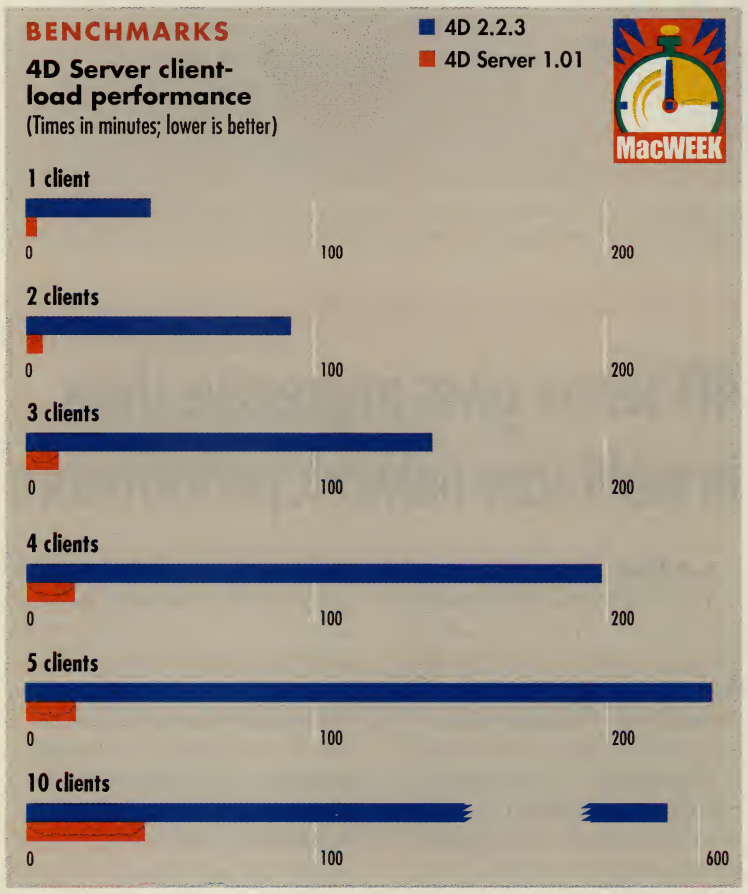
The test results show conclusively that 4D Server improves multi-user performance dramatically over 4th Dimension 2.2.3 (see benchmarks, this page and previous page). For example, 4D Server executed our nonoptimized search module 600 percent to 1,500 percent faster than 4D 2.2.3. The optimized 4D Server application performed about 2,000 percent to 6,000 percent better than the optimized 4D 2.2.3 application. In both cases, dramatic performance differences persisted at all user loads. With up to five clients, the optimized 4D Server application outperformed the basic (nonoptimized) 2.2.3 application running in single-user mode. For one or two clients, the basic Server application's performance was comparable to the single-user mode of the basic 2.2.3 application.

**Optimization important.** Although increases in performance occurred in all of the functions we tested, some of the built-in routines are still too slow to be used in a multi-user mode. 4th Dimension's rich and versatile programming language contains a wealth of tools that can (and should) be used to create functions and techniques that are more appropriate for multi-user applications. However, there are a few operations, such as sorting across relations, that, even when optimized, will be a costly technique for multi-user applications, and the prudent developer will avoid them.

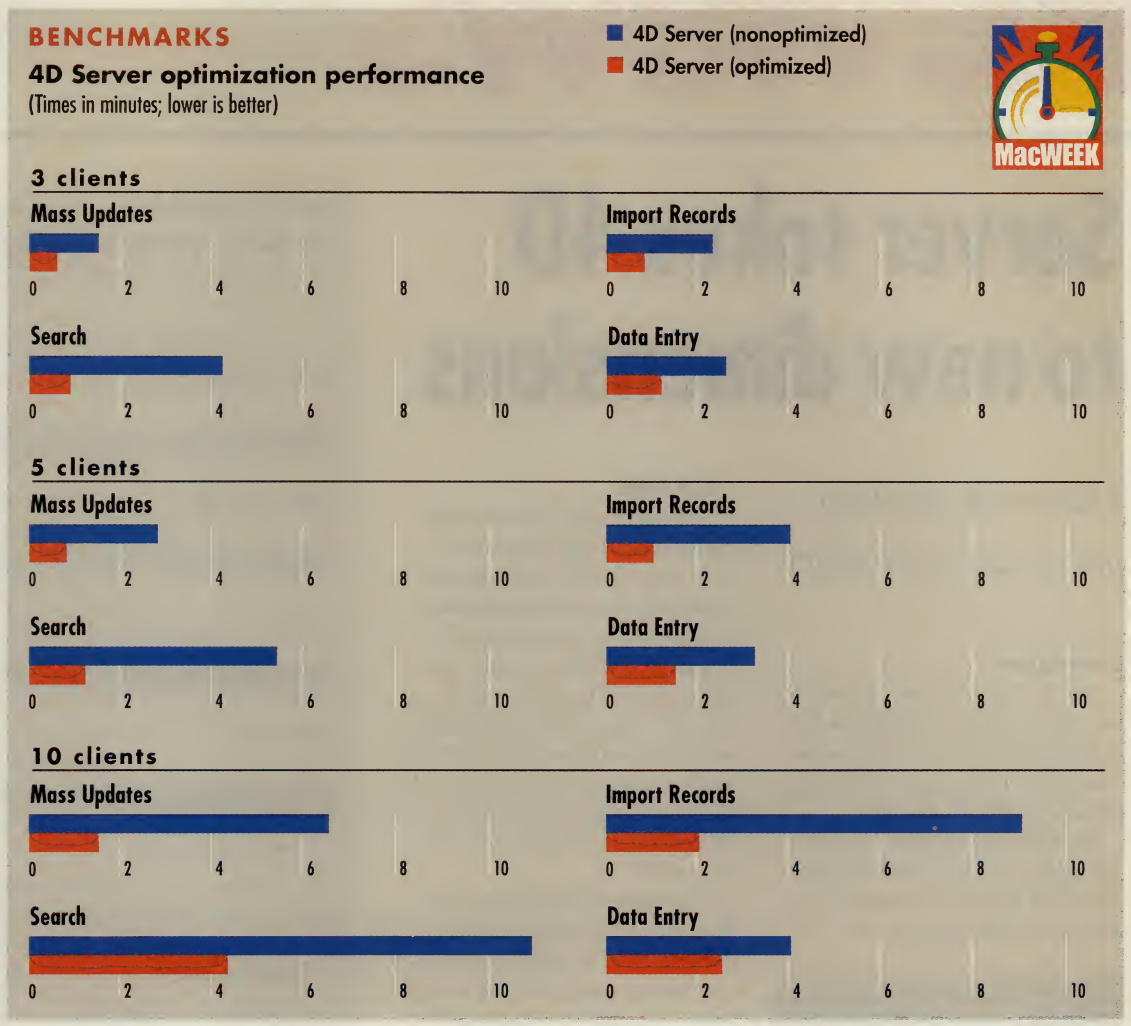
Most techniques used previously for 4th Dimension 2.2.3 multi-user optimization should still be productive, but the new client-server architecture introduces additional possibilities. ACI technical support should be consulted for recommendations on general usage. ACI, as well as third-party vendors, offers training on 4th Dimension programming that includes optimization techniques.

Since most developers use some amount of optimization to improve database performance, we incorporated some commonly used techniques during our testing. For example, rather than use the built-in automatic relations, we routinely employed searches on indexed fields. For complex searches across relations, we used multiple-indexed field searches. We created variables to hold the results of initial searches to use as the objects of subsequent searches.

Array operations — which are especially useful optimizing tools — were used to perform multi-record operations in lieu of such built-in functions as Apply To Selection. In our optimized application, all necessary records were first downloaded from the Server into an array (on the client), and the necessary data update was executed as an array operation. Then, after all updates were completed, the array data was copied back into the records on the host (see optimization benchmarks above).




*Tests were performed on an Ethernet network using a Quadra 950 as a server with 64 Mbytes of RAM and Mac IIci clients with 16 Mbytes of RAM, each running 4D Client 1.01. The test databases used were optimized for performance by ZD Labs (see performance story on Page 47 for more information) and contained 50,000 records. Times reported are total time taken to execute the full test suite.*




*Tests were performed on an Ethernet network using a Quadra 950 as a server with 64 Mbytes of RAM and Mac IIci clients with 16 Mbytes of RAM, each running 4D Client 1.01. For information on test modules, see chart on Page 47.*

**Size thresholds.** To determine whether 4D Server has performance thresholds in terms of database size or if its performance degradation is linear, we ran the optimized test application with data files of 50,000, 100,000, 150,000, 200,000 and 250,000 records. These tests were conducted with a single client, over Ethernet, with a Quadra 950-based host.

The time required to execute our Search and Data Entry modules was fairly linear with respect to the number of records. This was fortunate since these modules represent two of the most important aspects of multi-user database performance.

Our other modules did reveal performance drop-offs between 50,000 and 100,000 records. The Array To Selection command used in array handling appeared to exert the greatest influence on overall performance, with times increasing by 1,000 percent between these two file sizes and taking a full 30 percent of the overall trial time.

**Maintaining multiservers.** It is possible to save on licensing and hardware costs by maintaining multiple Server databases on one host CPU. ACI said this is allowed by its license.

The Server Key copy-protection device monitors the total number of client connections regardless of how many Server applications are installed. Our testing of two and three 4D Server applications running simultaneously with varying numbers of clients over Ethernet revealed that, in general, for a fixed amount of work, performance degraded slightly with multiple Server applications compared with a single application. Running 10 clients on multiple Server applications appeared to perform about the same as when running 10 clients under a single application.

One interesting aspect of our results was that the Server running in the foreground showed significantly better performance than when running in the background. A single Server application with five clients completed our trial in about 18 minutes; the front-most application in a two-Server test, handling five clients, completed our trial in about 25 minutes, or about 30 percent more slowly.

**LocalTalk, ARA impressive.** The limitations of network bandwidth on multi-user performance appear to be significantly diminished. We ran the optimized test application on a Quadra 950, over LocalTalk, to determine how efficient each area of database performance is over this slow LAN. To our surprise, there was very little difference in performance from that experienced with Ethernet.

Our tests did not attempt to simulate a typical work environment's background network traffic, but the results did indicate that acceptable results are obtainable with LocalTalk, provided the background traffic is not too high.

Accessing the server remotely with AppleTalk Remote Access (ARA) is certainly viable, provided some prudence is used. With ARA and two Practical Peripherals 14.4-Kbps modems, we connected a single client to the optimized test application on the Quadra 950. The overall time to complete all of our test modules was actually faster than our 4D 2.2.3 single-user baseline.

From another perspective, a single ARA client performed as well as each individual client over LocalTalk when three clients were using the Server.

Although our ARA tests revealed an almost 60 percent overall reduction in performance compared with that obtainable in a single client mode over either Ethernet or LocalTalk, two modules — Search and Data Entry — were the major contributors. Aside from these, ARA performed at 60 percent to 80 percent of Ethernet and LocalTalk speeds.

**Different iron.** Finally, we ran the optimized 4D Server application on a IIci over Ethernet to assess the importance of host hardware. For

*See Performance, next page*

## 4D Server

*From Page 47*

counts are available to registered 4D developers.

There is no upgrade path to 4D Server from 4th Dimension because ACI considers 4D Server a separate product. However, ACI has been offering limited-time discounts based on the quantity of 4D Runtimes owned. To upgrade an existing 4D Server license for additional users, ACI charges the difference between the price of your existing license and the price of the license desired.

**Copy protection.** As part of 4D Server's installation you must insert a small Apple Desktop Bus device, called the Server Key, between your keyboard and your Mac's ADB port. This Server Key contains the information 4D Server needs to permit the connections authorized by your 4D Clients' and 4D modules' licensing agreements. After the Server Key is in place, installing and setting up 4D Server is about as simple as it gets: The 4D Server application consists of a single file, just 734 Kbytes in size, and there are no control panel or extension files to be concerned with. The first time you launch 4D Server you will need to enter the license data for 4D Client and for any of ACI's add-on modules you will be using.

**Efficient approach.** A very important aspect of the client-server approach is that relatively few of a database's performance-sensitive activities take place on the client's workstation. This means you can allocate slower, less-expensive resources as clients while concentrating your investment in performance on a single machine for the server.

In ACI's approach, the 4D application's Structure file, its Data file and the 4D Server application are all installed on one Macintosh (the server, or "host"). Copies of 4D Client are installed as desired on other workstations on the network.

4D Client lets you request, receive and manipulate data, which is then sent back to 4D Server for processing. 4D Server contains the database engine: It performs the searches, sorts, calculations and other tasks requested by the clients. Since it alone has direct access to the data file, 4D Server can use sophisticated data-caching techniques not available to file servers to speed these operations. Moreover, only those results that currently need to be displayed at client workstations are returned to the client over the network. This approach greatly reduces the quantity of data that passes over the network and is a major contributor to the significantly improved performance that 4D Server offers.

> The client-server architecture that ACI provides in 4D Server is more sophisticated than that used by many large-scale systems.

The client-server architecture ACI provides is more sophisticated than that used by many larger-scale systems. The structural elements of a database, as well as its data, are managed by 4D Server. In performing this function it acts as an interface server — supplying procedures, scripts, layouts, menus and all other objects (such as external and 4D modules) that comprise the operational capabilities of a database. The quantities of simultaneously connected 4D Clients and all 4D modules being used with the server are controlled by 4D Server to ensure compliance with license agreements.

Because 4D Server includes all of 4D 3.0's database capabilities, applications developed with the 4D Server-Client combination can be used without modification with 4D 3.0, and vice versa. With 4D Server's multitasking capability, several developers can work on the same database structure at once, but ACI recommends off-line development (especially compiling) using 4th Dimension 3.01.

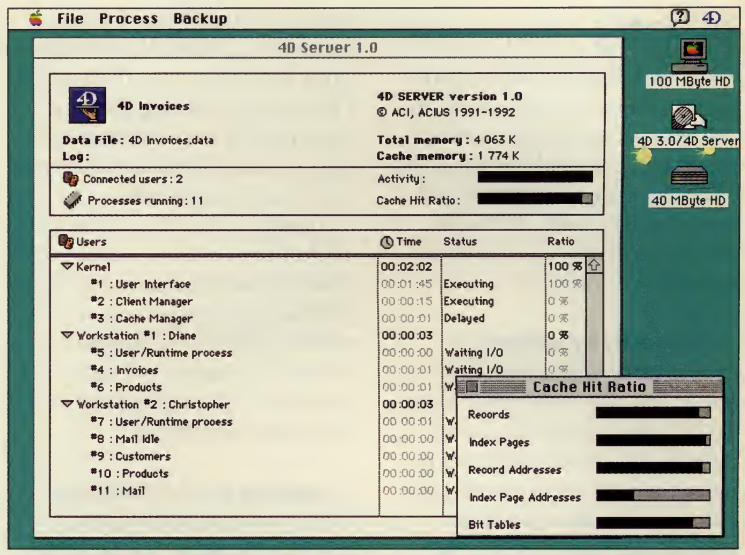
**Time-sliced multitasking.** Both 4D Server and 4D Client (as well as 4th Dimension 3.0) use time-sliced multitasking, enabling them to run multiple database processes concurrently. With the current Mac's single central processor chip, executing more than one high-level process at precisely the same moment is a physical impossibility. As an alternative, ACI slices the total processing time to divide execution among all open processes. Execution alternates among processes so rapidly that they appear to be executing simultaneously.

Multitasking is of fundamental importance to 4D Server: Each client is handled as a set of separate processes. Among the many advantages multitasking offers clients are the capabilities for multiple windows and for conducting time-consuming operations (such as importing, indexing and printing) in the background.

**Administration ease.** 4D Server's administrative interface consists of one easy-to-use graphically oriented Process window and three pull-down menus — File, Process and Backup (only enabled when you have the 4D Backup module installed). The main Process window displays the name of the database and data file currently in use, the size of the server's memory partition, the status of its data cache, the number of connected users, the number of processes and their statuses, and the current level of activity.

By clicking on the Cache Hit Ratio display, you open a small separate window that provides a

*See 4D Server, next page*




**The Process window in ACI US' 4D Server provides general information about the server as well as specific information on clients and processes. The Cache Hit Ratio window summarizes the use of data cache functions.**

## Performance

*From previous page*

these tests, 4D Server was installed on a IIci equipped with an Apple IIci Cache Card, 16 Mbytes of RAM, an 80-Mbyte Quantum hard drive and a 14-inch color monitor. 4D Server's application partition was set to 10 Mbytes, and its Data cache was allocated 4 Mbytes.

Because of 4D Server's client-server architecture, most database functions are accomplished on the server and, as might be expected, the choice of server hardware significantly affects performance. In our testing, use of the Quadra 950-based Server resulted in 80 percent to 170 percent better performance than the IIci-based Server. Still, when compared with our 4th Dimension 2.2.3 single-user baseline, the Mac IIci produced acceptable results and demonstrated that it is not necessary to resort to high-end hardware for an acceptable solution.

**Conclusions.** Our results prove conclusively that 4D Server can deliver greatly improved multi-user performance compared with its predecessor. 4D Server's performance holds up well when loaded with increasing numbers of records and clients. The magnitude of this improvement is sufficient to greatly increase the viability of practical multi-user applications on the Mac.

Our tests were extremely rigorous, and they loaded the workstations much more heavily than most real-world situations (see story, right). We emphasize that these are comparative tests, but they are not absolute benchmarks that will apply equally in all cases. □

### Serving up 4D's test bed at ZD Labs

To assess the performance of 4D Server, ACI US Inc.'s client-server database manager, we undertook a comprehensive series of tests at Ziff-Davis Labs in Foster City, Calif.

Our testing focused on comparing 4D Server's performance to its predecessor, 4th Dimension 2.2.3, so that we could give our readers an apples-to-apples evaluation. We also examined the scalability of our results in terms of numbers of clients and database size and the sensitivity of these results to CPU and network configurations.

**Multimodule test application.** To conduct the tests, we developed a 4D application with eight modules designed to exercise key database functions: searching, sorting, array handling, mass updates (applying formulas), importing records, deleting records, data entry and transactions. Where appropriate, these modules were constructed of elements to exercise different aspects of the function being tested. For instance, the Search module included indexed, related and compound searches that resulted in both one and many records found.

It's important to note that our test approach loaded each workstation much more heavily than any typical user in the workplace. Our tests were designed to provide comparative data for one approach or configuration vs. another, not absolute benchmark times for the functions tested.

Four slightly different versions of our test application were used to provide the comparative data we were after, as well as insight into the scope and behavior of ACI's improvements. Tests were run with a basic, or nonoptimized, 4th Dimension 2.2.3 version, a basic 4D Client 1.01 version, an optimized 4D 2.2.3 version and an optimized 4D Client 1.01 version.

**Results baselined to single user.** Before we began multi-user testing, we established a reference baseline: the basic 4th Dimension 2.2.3 version of our test application operating in single-user mode. A Macintosh IIci with a 32-Kbyte static-RAM cache, 16 Mbytes of RAM, a 230-Mbyte Seagate hard drive and a 14-inch color monitor was used for this purpose. The results of this test should serve as a meaningful performance yardstick for readers acquainted with the previous version of 4D.

For the majority of our multi-user tests, our server consisted of a Quadra 950 with 64 Mbytes of RAM, a 1.3-Gbyte GCC Technologies Inc. Ultradrive 1300X hard drive and a 13-inch Apple monitor. The 4D Server tests were conducted with 4D Server 1.01 installed with a 40-Mbyte application partition and a 20-Mbyte Data cache. AppleShare 3.0 was used as the file-server software for the 4D 2.2.3 multi-user tests.

The hardware for our clients consisted of Mac IIci machines equipped with Apple IIci Cache Cards, 16 Mbytes of RAM, 230-Mbyte Seagate hard drives and 14-inch color monitors. For the 4D Server portions, 4D Client 1.01 was installed with a 2.5-Mbyte application partition. For the 4D 2.2.3 portions, 4D Runtime 2.2.3 was installed with a 2.5-Mbyte application partition.

Network hardware adapters consisted of Asanté Technologies Inc. Ethernet cards in the IIci machines and an Asanté FriendlyNet Ethernet Transceiver on the Quadra 950. — By Mel Male

## 4D Server

*From previous page*

server cache utilization summary for five different cached elements: records, record addresses, index pages, index page addresses and bit tables. Because of its time-sliced multitasking system, 4D Server can automatically adjust itself for optimum performance.

**Connectivity options.** In its standard configuration, 4D Server and 4D Client run on any AppleTalk-compatible network including LocalTalk, Ethernet or token ring. Remote and portable Macs can also connect using a modem and AppleTalk Remote Access (or similar software).

By using some of 4D's connectivity modules, such as 4D Oracle, 4D SQL Server or 4D DAL (all sold separately by ACI), a 4D Client may be connected simultaneously to 4D Server and database managers from Oracle Corp., Sybase Inc., Digital Equipment Corp. and IBM Corp. Because 4D Client is multitasking, you have the capability to perform operations on data from several different sources at the same time.

Another of ACI's products, the 4D API Kit, contains a set of code libraries, documentation and examples that programmers can use to enable applications other than Client to connect to 4D Server as users with a full range of client-interaction capabilities.

**Logging on, backing up.** When you launch 4D Client, a dialog box appears, similar to the Chooser, listing the accessible zones and the 4D Servers in the currently selected zone. To connect, just double-click on the server desired or select it and click the OK button.

An alternative approach to this procedure is available through the Password Editor, which allows you to create a path document that automatically connects you to a specific database each time 4D Client is launched. The path document is saved with your password in the Password Editor.

The 4D Server application has a Backup menu in its menu bar, but it is nonfunctional. If you need backup capability within 4D Server, you can purchase ACI's 4D Backup, an add-on module that lets you perform incremental or full backups, restore data from sequential log files, and initiate database mirroring. 4D Backup lists for $195 for the three- and six-user environments and $695 to accommodate 10 or more users.

**Documentation and support.** The shrink-wrapped 4D Server package includes the entire nine-manual documentation package that comes with 4D 3.0, along with a 4D Server User Manual. ACI's manuals are extremely comprehensive and well-organized. Their style and layout makes them easy to read, and the numerous illustrations and examples are quite helpful.

ACI's support personnel are knowledgeable and responsive. Additional user services offered include in-depth training, seminars and workshops. The needs of professional consultants and writers of vertical-market applications are addressed through ACI's excellent developer programs.

**Conclusions.** 4D Server is a revolutionary product, designed from the bottom up for high performance and scalability within the Mac platform. We have only a couple of niggling concerns — the hardware key and the need to pay extra for backup capabilities — but overall, 4D Server is an impressive product. ACI has delivered the goods on performance that Macintosh users have been clamoring for over the years, and as a result, 4D Server greatly expands the scope of multi-user database applications for the Mac.

ACI US Inc. is at 10351 Bubb Road, Cupertino, Calif. 95014. Phone (408) 252-4444; fax (408) 252-0831. □

**SYSTEM 7 COMPATIBILITY**

| 4D Server 1.01 | |
|---|---|
| Balloon help | Yes |
| TrueType | Yes |
| Publish and subscribe | n/a |
| Apple events | Yes |
| 32-bit addressing* | Yes |

**According to vendor.*

# Updated 4D Compiler adds to database speed gains

Like programs written in high-level languages such as C, Pascal and BASIC, instructions written in ACI US Inc.'s 4th Dimension procedural language must be translated into a lower-level machine-readable format before they can be understood by the Mac's microprocessor. When you normally run your database application, 4th Dimension or 4D Server translates your procedures on the fly each time it executes them.

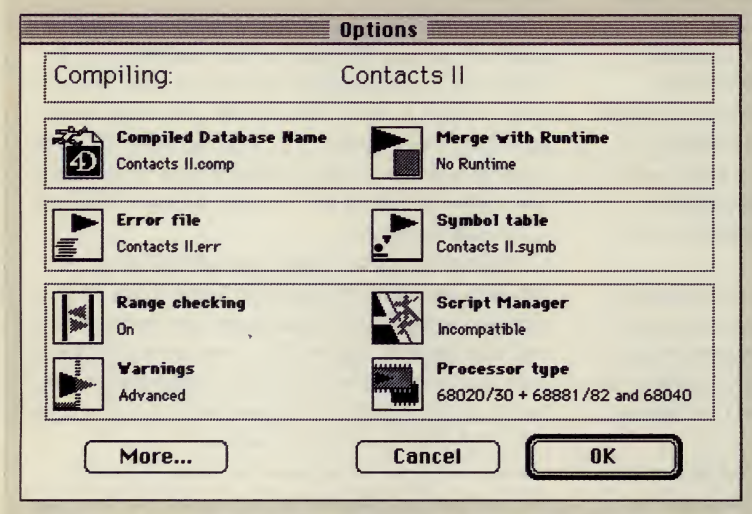
A far more efficient approach is to use ACI's 4D Compiler to translate your application's scripts and procedures into machine-executable object code and save it as a compiled structure file that can be used in either single- or multi-user environments in exactly the same manner as the uncompiled original.

ACI's product literature states that compiling will increase the performance of your 4th Dimension applications from three to 1,000 times. How much your applications improve depends on the quantity and specific nature of their procedures.

If you choose to compile your 4th Dimension 3.0 or 4D Server databases, you must use the recently released 4D Compiler 2.0; prior versions are not compatible. 4D Compiler 2.0 lists for $1,000; upgrades are available for $195.

**Compiling benefits.** The improved performance of the compiled code stems from two separate factors: the prior-to-use, one-time-only code translation and direct access to variable and procedure addresses. As part of its translation process, the Compiler attaches an address to each of your program's variables and writes the address directly into the compiled code.

In addition to speeding execution, compiling provides other important benefits. The Compiler systematically and rigorously checks all of your procedural statements. Additionally, since the Design environment cannot be accessed in a compiled application, the database structure cannot be modified, intentionally or by accident, and details of your procedures are protected.




**Except for the More button in its lower left corner, 4D Compiler 2.0's main window looks and functions as in the previous version.**

**Debugging speed.** 4D Compiler is exceptionally easy to use, but as with all compilers, the real challenge lies in debugging. This is where both 4D Compiler and 4D itself really shine. As in previous versions, when 4D Compiler 2.0 encounters errors or ambiguities that prevent it from compiling your procedures, it creates an error file that 4th Dimension is able to access. By using one of 4D's built-in commands, you can have 4D sequentially locate the source of each error, open the offending procedure, highlight the error, and display the error message or warning. Then you can make the necessary corrections and move on to the next error.

**Increased flexibility.** Version 2.0's main Options window looks and functions as it did in the previous version, but there's a More button in the lower left corner, which, when clicked, opens a second window with eight new, nonmandatory options. In a System 7 environment, balloon help provides information about all of the possible choices.

**4D Compiler 2.0's Options window has a second "page" with eight new nonmandatory options. In a System 7 environment, balloon help provides information about all of the possible choices, an example of ACI's excellent documentation.**

Of greatest importance to most users will be Optimization, which generates more efficient and compact code than the default Normal mode. Using this option makes compilation slower, but the resulting database execution speed will often be noticeably faster.

Choosing the new Typing File option produces a text file with compiler declarations for all of your variables. These can be copied and pasted into your database's procedures, saving the trouble of typing them from scratch.

Another new feature, Automatic Version Numbering, creates or modifies the "vers" resource revealed by the Finder's Get Info command. This option, while convenient, lacks the versatility for numbering that you have when you use Apple's resource editor, ResEdit, for this purpose.

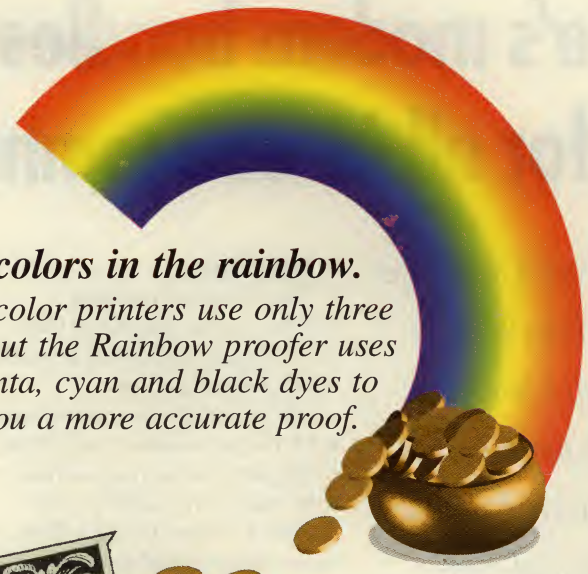
Greater flexibility now exists for defining variable types and variable initialization. The Initialize Local Variables option provides three choices: Default Button Type, Default Number Type and Default Alphanumeric Type options. These let you optimize database execution by declaring untyped buttons and numbers to Long Integer instead of the default Real, and alphanumeric variables to String rather than the default Text.

Finally, two choices for speeding compilation, both related to compilation passes for variable typing, are provided with the new Compilation Path option. Instead of using the default, Execute All Passes, you can select Process And Interprocess Variables Have Been Typed (which skips these typing phases) or All Variables Have Been Typed (which skips all typing phases). — *By Mel Male*

# Think of this as a guide to improving your work.

### *Avoid hazardous traps.*

*Make sure you see traps and overprints before you make films. The 3M Rainbow™ desktop color proofing system is the only continuous-tone PostScript™ desktop system that shows them.*



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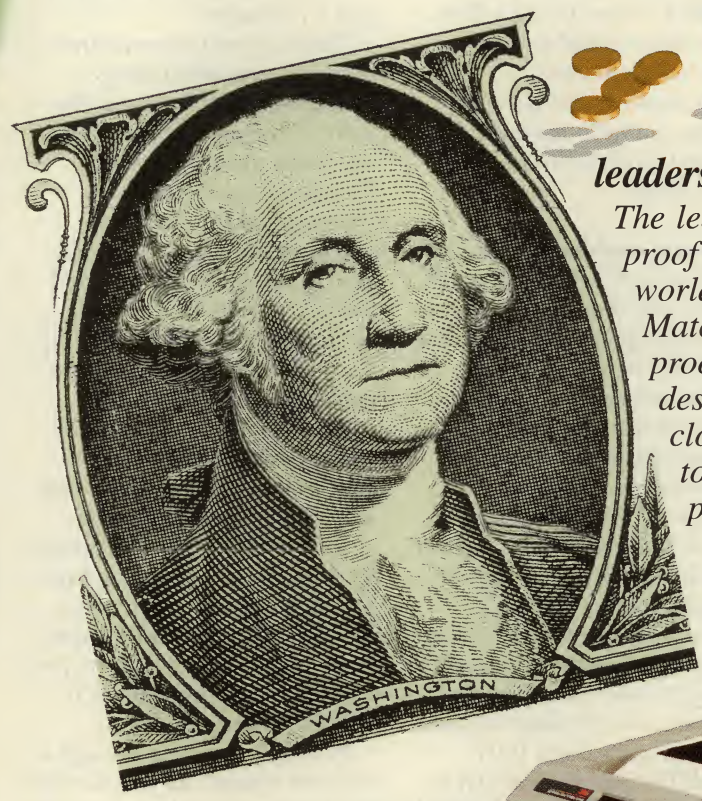
*Most desktop color printers use only three inks. But the Rainbow proofer uses yellow, magenta, cyan and black dyes to give you a more accurate proof.*




### *Acquire leadership qualities.*

*The leading contract proof throughout the world is the 3M Matchprint™ color proof. Guess which desktop proof is as close as you can get to a Matchprint proof?*

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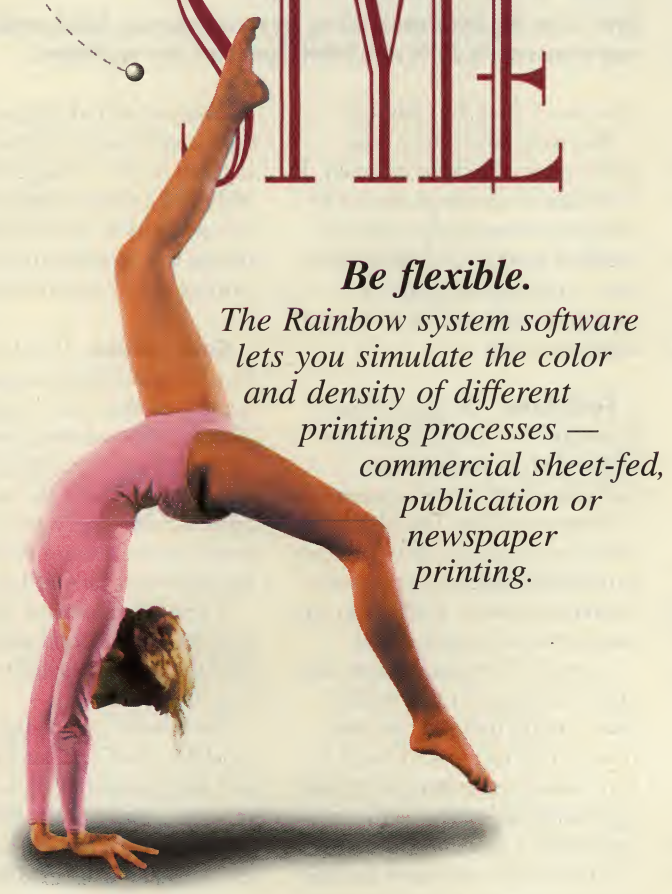
*Most desktop proofing systems won't allow you to print a true spread image without tiling. The Rainbow proofing system, on the other hand, has an 11.9" x 17.2" image area.*

STYLE



### *Be flexible.*

*The Rainbow system software lets you simulate the color and density of different printing processes — commercial sheet-fed, publication or newspaper printing.*

### *Use the 3M Rainbow desktop color proofing system.*

*If you want a better way to evaluate your work before making films, this is it. As this guide shows, the Rainbow proofing system is far superior to other color printers.*

### *Call an expert.*

*For more information about the Rainbow desktop color proofing system or to have a 3M sales representative contact you, call 800-328-1684, ext. 350. 3M Image Reprographic Systems Division, 3M Printing and Publishing Systems Division, 3M Center Bldg. 223-2N-01, St. Paul, MN 55144-1000.*

3M Imaging

# Dove's modem bundles voice, data, fax for all-in-one communications

*Aimed at small businesses, DoveFax Pro+Voice functions as a telephone answering machine, a voice-mail server, and a 14.4-Kbps send-and-receive fax-data modem.*

**By Neil Shapiro**

The DoveFax Pro+Voice V.32bis modem from Dove Computer Corp. is intended to be a jack-of-all-phone-functions.

The unit sends and receives faxes at 14.4 Kbps, works as a sophisticated telephone answering machine or voice-mail server, and transmits data at 14.4 Kbps. Priced at $749, the modem is aimed at small businesses and single users.

A version that provides 2,400-bps data and 9,600-bps fax capabilities, the DoveFax+Voice, is available for $449.

**A vocal contributor.** Installing the DoveFax Pro+Voice is not difficult, but a lot of setup is required to take full advantage of voice features.

The first step in setting up voice answering is to record two announcements: the initialization message and the answer message.

The initialization message is played every time the phone is answered: It greets the caller, instructs the caller how to get a help recording and requests a Caller ID. (All caller input is entered with the keypad on a touch-tone phone.) Following the initialization message, either an answer message or a message cued by the Caller ID is played. The unit then waits for an incoming message, which is recorded to disk as a digitized sound file.

This two-step process can be disconcerting to callers accustomed to voice-mail systems that consist of a single message followed by a tone. It would be nice if the system had the option of bypassing the initialization message or of interrupting it with a touch-tone signal. (Dove offers a NuBus version of its system that reportedly features the latter capability.)

Different answering messages can be set to play at different times. These can be set for various days of the week or times of the day, holidays, or specific dates. For example, a message could say, "Hello, our business hours are 9 to 5. Please call back tomorrow." Or, it can play a generic "Hello, leave your name and number" message.

Creative use of Caller IDs allows you to make dial-in bulletin boards or voice mailboxes. What you cannot create, however, is a tree-oriented system that has a hierarchy of mailboxes. After the initialization message has been played, you can go to only one mailbox and leave a message.

**Message forwarding.** Beyond simple voice answering, the unit can automatically forward messages to another phone or beeper. It can dial the second phone, request a password from the user who answers and then play back the messages.

You can also call in remotely to pick up messages.

There is a lot of setup required to design the various recordings. A Recording Studio application lets users easily create and edit voice recordings with the DoveFax Pro+Voice's microphone. The designer speaks into the microphone, and his or her voice is digitized to disk. It can then be played back and re-recorded if needed. Editing features show a graphic representation of the sound and allow cut-and-paste editing. You can import SoundEdit, .snd and AIFF (Audio Interchange File Format) files — using sampling rates as high as 22 kHz — to use as messages.

Dove provides a good mechanism for saving incoming voice messages to disk, allowing you to set aside a specified amount of hard disk space for recording. If the maximum space is reached, a user-created "out of resource" message is played.

Picking up incoming messages is intuitive. A list of calls with date and time stamps is provided. If the caller used a Caller ID, then the ID name is also shown. Double-clicking on an entry will replay the digitized message. If the ID has a corresponding phone-book entry, an automatic dial for a return call can be initiated.

**Fax and figures.** Dove bundles FAXstf from STF Technologies Inc. with the DoveFax. This fax software is so common among modem vendors that it's easier to list the companies that don't use it than those that do. FAXstf provides a full-featured suite of programs, including the Fax Manager application, the FaxPrint Chooser document, the FaxMenu control panel, the QuickFax and FaxStatus desk accessories, as well as associated system extensions and drivers.

The FaxPrint Chooser document allows for a fax to be sent from within any application that has print capabilities. Once FaxPrint is selected in the Chooser, an application's Print and Page Setup choices (usually under the File menu) will change to Fax and Fax Setup. The FaxMenu control panel allows the user to activate the fax capability without using the Chooser.

Receiving faxes can be done either automatically or manually. In automatic mode the phone can be answered immediately or after a specified number of rings (so that a user can pick up the phone if expecting a voice call or let it ring if expecting a fax).

**Fast data.** The speed of the DoveFax Pro+Voice puts it at the high end of the available data modems, and the price is comparable to others in its class. The 14.4-Kbps data capability allows for connection to networks, bulletin board systems and other modems. The Hayes command set is well-implemented.

A supplied communications program, Terminal 2.1.d, is neither automatically installed nor mentioned in the manuals. While it is bare-bones, it does have file transfer capabilities and can be set to automatically log you onto Dove's BBS.

The documentation for the unit is minimal, and it is split into several parts for fax, data and voice. There is no overview of how all the parts work together and no examples of setting up different kinds of voice systems.

Dove said it plans to release a software upgrade at the beginning of May that will add high-end voice-mail features, such as scripting, and more. We hope it will also address the shortcomings in the documentation. An even later release will allow the modem to work as an automated fax server.

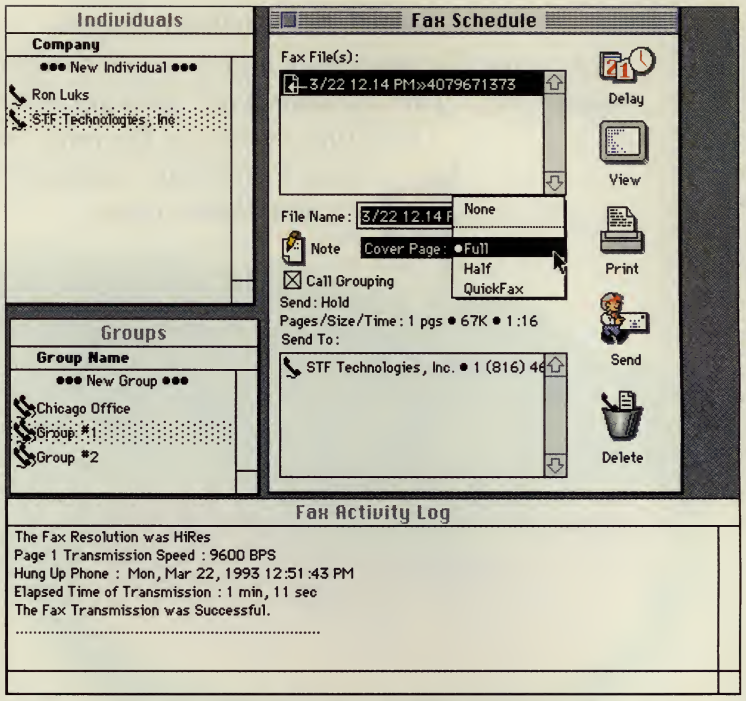
**Conclusions.** The DoveFax Pro+Voice combines a number of useful capabilities into a single unit. Most institutional users, however, will find its voice capabilities and operation well below the standard of expensive dedicated voice-mail systems. Its voice features are best-suited for single users and small groups.

The FAXstf software included with the unit is a solid market standard that integrates well with the Mac environment.

For those who want only the voice capability, the DoveFax+Voice, with its 2,400-bps data speed, is a better value than the DoveFax Pro+Voice.

While users who need only fax and data capabilities may find better deals elsewhere, individuals who need fax, data and answering-machine capabilities rolled together may find that the DoveFax Pro+Voice says it all.

Dove Computer Corp. is at 1200 N. 23rd St., Wilmington, N.C. 28405. Phone (919) 343-5600; fax (919) 343-5695. □




**The DoveFax Pro+Voice modem ships with the industry-standard FAXstf software from STF Technologies. The FaxManager shown here allows addresses to be dragged from individual or group windows to the destination list.**

**Dove's Recording Studio makes editing voice recordings easy. Edited sounds can be used as messages in dial-in voice bulletin boards and other applications.**

*score card*

**DoveFax Pro+Voice**

**Dove Computer Corp.**
**List price: $749**
**Overall value** ◆◆◆

The DoveFax Pro+Voice unit offers fax send and receive at 14.4 Kbps, voice-based phone answering and 14.4-Kbps V.32bis data transfer all in one unit. As a voice-answering machine it can be configured to recognize individual IDs to play customized messages, messages that are time- or date-dependent, and forward messages. The voice-mail features, combined with high-speed fax-data modem performance, make it a good all-around choice for single users and small businesses. An update next month should add some power to the voice-mail capabilities, which will make the unit more versatile. The documentation, however, does need to be improved.

**Performance** ◆◆◆
**Features** ◆◆◆
**Configuration** ◆◆◆
**Compatibility** ◆◆◆◆
**Documentation/support** ◆◆

# Give your network a future.

*RISC·Router 3000E Ethernet-to-Ethernet Router, with 2 LocalTalks, $2995.*

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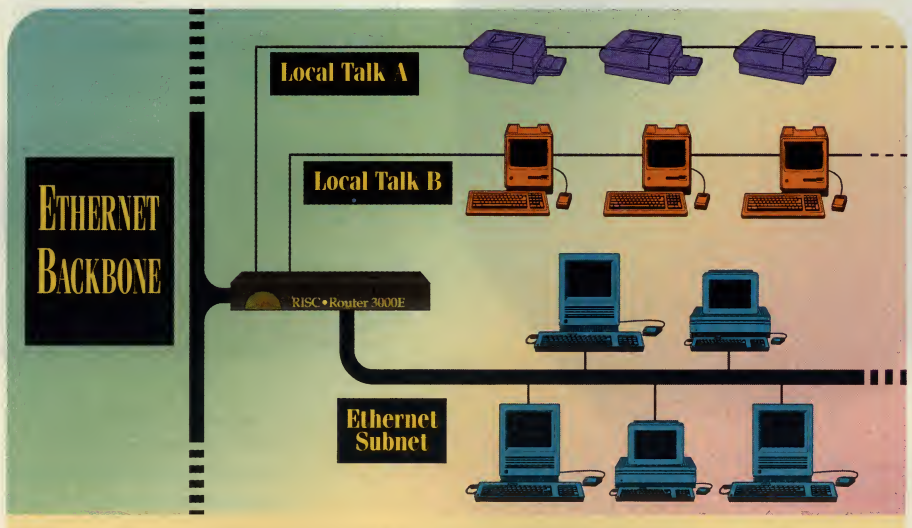


*RISC·Router 3000E creates an Ethernet subnet . This makes both the subnet and the backbone faster. It also creates a "firewall" which isolates each of the networks from problems on the other.*

*Route between two Ethernets and two LocalTalks for about the same cost as a GatorBox or a FastPath.*

**Q:** *Does the RISC·Router 3000E support the standard set of features I've been using on my Ethernet-to-LocalTalk routers?*

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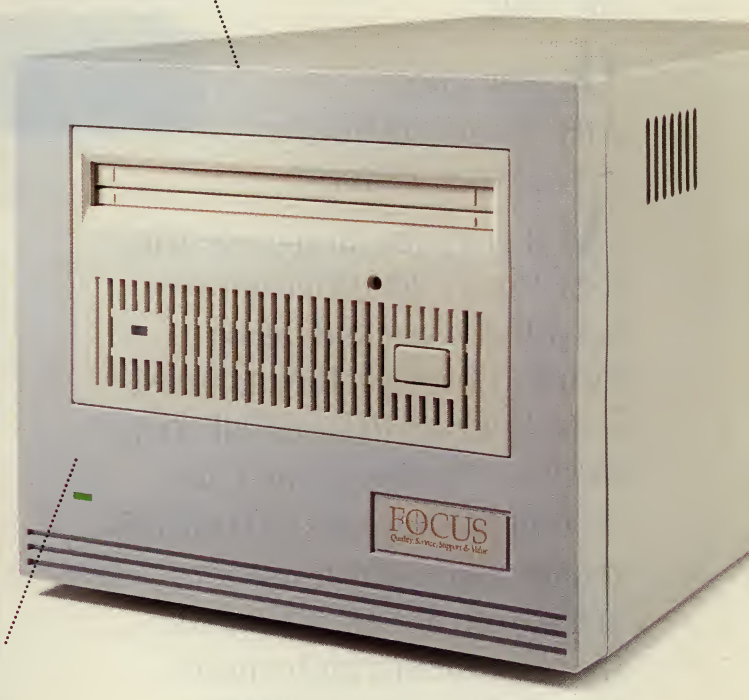


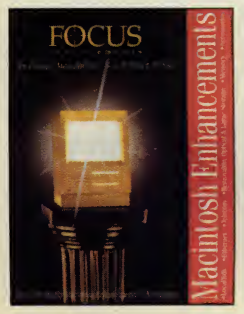


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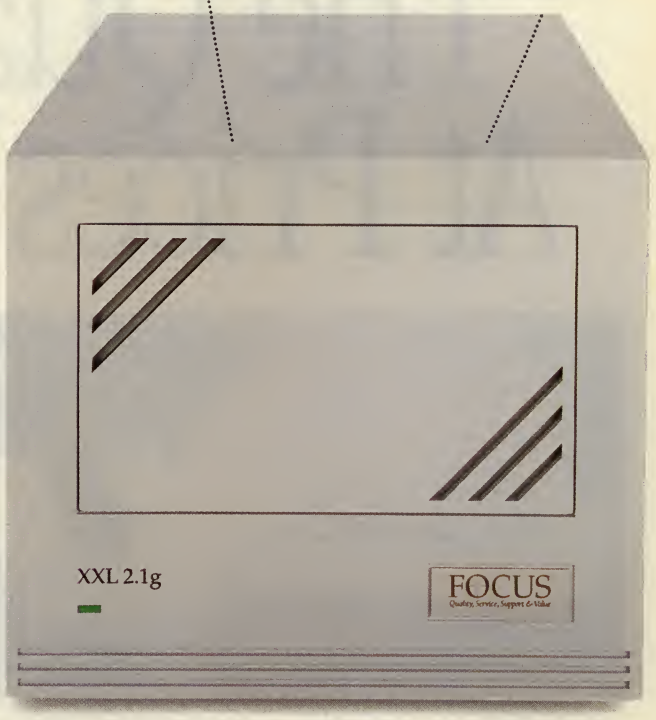


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# PRODUCT WATCH

- Buying info
- Expert advice

# Companies warming up to thermal-wax color

*The high quality and affordability of thermal-wax output is giving it an advantage over inkjets.*

By Mitzi Waltz

For vivid color with reliable results, thermal-wax printers are an attractive solution for business users. When used for presentations, thermal-wax printers output high-quality color transparencies. And for corporate communications on paper, such as color handouts for meetings, package design proofs, advertising mock-ups and point-of-purchase materials, the embossed look of thermal-wax output is quite good, according to users.

**Affordable color.** Best of all, these printers have come down substantially in price. Most models now list for less than $6,000, with a few priced less than $3,000. With substantial discounts available at dealers or through mail order, that makes thermal-wax technology extremely competitive with inkjet printers.

Since inkjet technology offers more-limited color quality and control, moving to thermal for at least some applications is a tempting proposition for many companies.

Major products in the thermal-printer market include the Phaser 200e and 200i from Tektronix Inc., the Polaroid TX-1500 (a hybrid dye-diffusion thermal printer) from Polaroid Corp, the QMS ColorScript Model 210 and Model 230 from QMS Inc., the Spectra*Star Q10e and Q10 from General Parametrics Corp., and the Personal ColorPoint PSE and ColorPoint PSX Model 4 from Seiko Instruments USA Inc.

Mail-order vendor Hardware That Fits also markets its own thermal-wax device under the RealTech label. Prices vary according to output size, PostScript capability, speed, and the amount of RAM and built-in fonts provided as part of the overall package.

**Service-bureau quality.** For Rick King, owner of Rick King Design, a graphic arts design company in Escalon, Calif., his Tektronix Phaser 200e has been surprisingly well-suited for printing color documents and graphics.

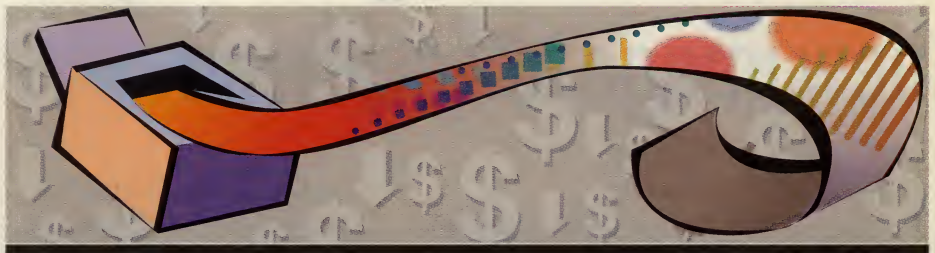
"I've had color output from service bureaus in the past that was a little bit off," he said. "In contrast, I'm pretty impressed with the quality of this machine's output, for both text and graphics. Because it's wax ink on the coated paper, my text looks sharper than toner on plain paper."

On the other hand, King noted that coated paper and wax have a drawback: higher cost per page. "On the laser printer, output costs are probably a matter of a few pennies," he said. "The thermal printer costs about 80 cents a pop." For that reason, King prints page proofs on his laser printer, saving the Phaser for final color copy whenever possible.

The Phaser prints a composite black by overlaying red, green and blue ink. "That was my biggest concern," King said, "but it's pretty much a 'black' black. Even when I'm using fine serifs, like in a Bodoni type, it registers well. Black halftones do lean a little bit to the brown side, but that's nothing I can't live with."

**Overhead master.** For in-house presentation specialists, thermal-wax printers have special appeal. Scott Brown, marketing communications manager at Poly-Medica Industries Inc. of Woburn, Mass., said he chose his RealTech

*See Thermal wax, Page 60*



**Features of low-cost color printers**

| NAME/COMPANY | PRICE | MAX. PAPER SIZE | PLAIN PAPER | ADOBE POSTSCRIPT | TRUE BLACK |
|---|---|---|---|---|---|
| CalComp ColorMaster Plus 6603PS | $4,995 | letter | • | • | • |
| CalComp ColorMaster Plus 6613PS | $6,995 | tabloid | • | • | • |
| General Parametrics Spectra*Star Q10e | $3,799 | letter/A | | | • |
| General Parametrics Spectra*Star Q10 | $4,999 | tabloid | | | • |
| Hardware That Fits RealTech Color 350 | $5,995 | tabloid | • | | • |
| Hewlett-Packard PaintJet XL300 | $2,795 | ledger | • | * | • |
| Hewlett-Packard PaintJet | $885 | ledger | • | * | • |
| Hewlett-Packard DeskWriter 550C | $879 | legal | • | | • |
| Hewlett-Packard DeskWriter C | $619 | letter | • | | ** |
| Hewlett-Packard DeskJet 550C | $879 | legal | • | | • |
| Hewlett-Packard DeskJet 500C | $619 | letter | • | | ** |
| Polaroid TX-1500 | $3,995 | 4x5 | | | |
| QMS ColorScript Model 210 | $6,995 | legal | • | | • |
| QMS ColorScript Model 230 | $5,995 | tabloid | | | • |
| Seiko Personal ColorPoint PSE | $2,999 | legal | • | • | |
| Seiko ColorPoint PSX Model 4 | $5,999 | tabloid | | • | |
| Tektronix ColorQuick Ink-Jet Printer | $2,495 | tabloid | | • | |
| Tektronix Phaser III PXi | $9,995 | tabloid | • | • | • |
| Tektronix Phaser 200e | $3,696 | letter | • | • | |
| Tektronix Phaser 200i | $5,995 | letter | • | • | |

** PostScript available as an option.*
*** Separate true-black cartridge available for text-only printing.*

NEVIN BERGER

# Color inkjet printers: Prices remain competitive

*But as other color printers have become less expensive, inkjet models have lost some luster.*

By Mitzi Waltz

When color inkjet printers first came on the scene, they were the only affordable game in town. In the Mac market, that game had just two major players, Tektronix Inc. and Hewlett-Packard Co. — and since Sharp Electronics Corp. recently discontinued its JX-730 Color Ink Jet Printer, they still dominate the field.

Although color-printer sales have grown from 30 percent to 35 percent each year, according to industry analysts, there has been a good deal of grumbling about the quality of color inkjet printing from the very beginning.

The first models produced only a composite black, made up of red, green and blue ink, and almost always a muddy brown in appearance. Since then, however, four-color ink cartridges have been developed, leading to crisper black text alongside color graphics.

Other problems have included the hassle and expense of using either special-coated paper or, if one chooses to use plain paper, living with bleeding ink and fuzzy outlines, easily clogged inkjet mechanisms, and poor color saturation.

The result: As other types of color printers have come down in price, color inkjet printers are increasingly being overlooked by many buyers. In response, Tektronix is now downplaying its Phaser II series, while fellow pioneer Hewlett-Packard is said to be planning a move toward thermal-wax transfer and dye-sublimation technologies as well.

**Holding onto inkjet.** In the meantime, however, Hewlett-Packard continues to improve its inkjet line and has just announced plans for a new generation of inkjet printers.

The first model the company plans to bring to market will be the HP

*See Inkjet, next page*

Case Study

# Thermal wax brightens up new image at Lockheed

*To stay competitive, Lockheed has turned to thermal-wax printing technology.*

By Mitzi Waltz

The post-Cold War slashes in defense spending have put the heat on companies that supply products to the military.

"These days, the need to effectively communicate with the customer is important — you've got to do everything you can do to enhance that," said Mark Judge, a data systems engineer at Lockheed Maritime Systems Center of McLean, Va. Judge's department is responsible for presenting conceptual designs and new system ideas for items as varied as ships, aircraft and sonar equipment.

Judge said he uses Mac technology for a number of executive-level briefings each month. "Generally, a briefing will include slides or transparencies, plus four or five color papers to hand out." Previously, he had occasionally used a color inkjet printer to produce color materials, although the poor quality of the results made him wary.

According to Judge, the process was much improved when the company added a CalComp ColorMaster Plus 6603PS printer from CalComp Inc., a color thermal-wax printer that can create letter-size output and supports PostScript.

**Improved in all areas.** "We're able to crank these things out fairly quickly on the ColorMaster and get good quality, whereas with the inkjet it takes forever," Judge said.

"The first image is the one that takes all the time. When you do multiple images, the others follow in quick succession once it's all set up," he said.

The printer also has the advantage of producing a true black, via a four-color cartridge, rather than a composite black. As for color quality, he said, "I think it's great — not as good as a dye-sublimation printer, but considering the price, it's quite good."

Judge has found that he can alternate film and paper in the feeder for the same press run, a feature that's especially handy when preparing a presentation that includes take-home papers that match the overheads shown. "I don't know if that's a documented feature," he said, "but I do it all the time and it works just fine."

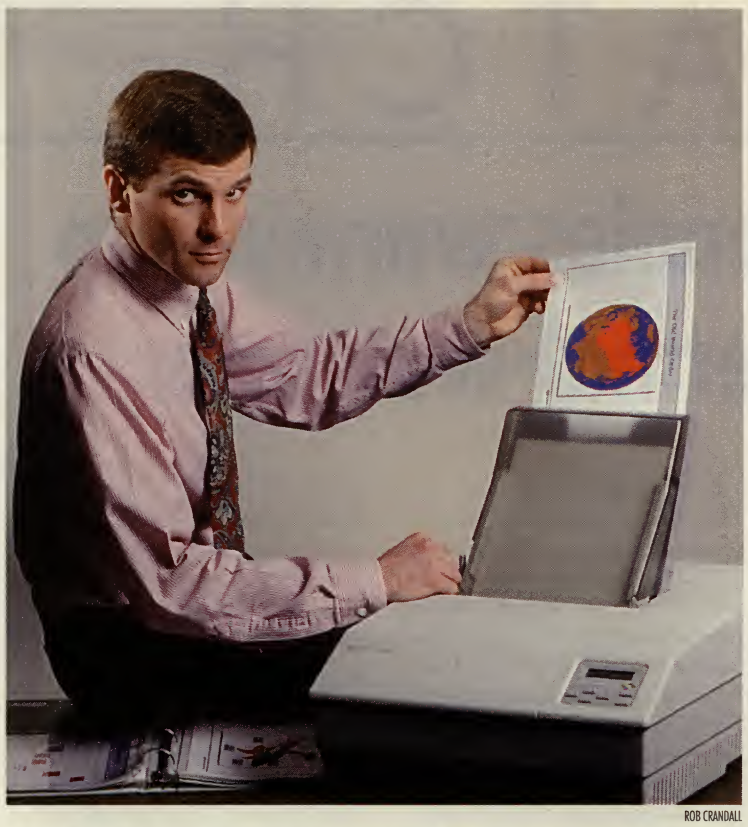
**A few problems.** Of course, every piece of equipment has its downside.

For Judge, the ColorMaster's main handicap is the special media required. "It's a special paper you have to get from CalComp that has a tear-off margin for the paper-handling mechanism," he said. "It would be nice to be able to stick regular paper in there. It's kind of annoying to have to tear that piece off."

Also, printed colors don't always match screen colors, he said. "It's not as big a deal to us as it would be to some others," Judge said. CalComp recently announced that it will support color-matching systems from Electronics For Imaging Inc. and Eastman Kodak Co.

**Spicing up olive-drab days.** "Before we had this printer, most of our briefings were in black and white; about the most complex thing we did was bullet charts," Judge said. "[The ColorMaster output] has just improved our overall image. We definitely look different compared to other companies, just because we've got lots of graphics and bright colors in everything we show."

Judge said that color capability of the ColorMaster has also increased his department's flexibility. "If [my boss] wants to change something, he can do it within an hour or two," he said. "If we wanted to do that kind of thing before, we had to send it out to a service bureau." □



ROB CRANDALL

**Mark Judge, a data systems engineer at Lockheed Maritime Systems Center, prepares a color report using the CalComp ColorMaster Plus 6603PS printer.**

## Inkjet

*From previous page*

DeskJet 12000/PS, a four-color, RISC-based inkjet printer that supports PostScript Level 2 and is said to be scheduled for May shipment at a cost of about $2,399 (see MacWEEK, March 29).

> "We had an HP color inkjet, but recently we decided to purchase a thermal-wax transfer printer."
>
> — Mark Judge

The company already offers quite a few low-cost plain-paper color printers, from the $619 DeskWriter C to the $3,995 PostScript Level 2-equipped PaintJet XL300. HP's DeskWriter series is Mac-specific, while its otherwise-identical DeskJet printers are configured for cross-platform use. All are plain-paper-capable.

Except for the DeskWriter C and its twin, the DeskJet 500C, all can produce true blacks with color output. The two low-end models offer the option of color output with composite black or true black only (via a separate black cartridge) for plain text output.

But despite these advances, many of the HP faithful are looking to new printer types. "We had an HP color inkjet — actually, we still have a couple — but recently we decided to purchase a thermal-wax printer," said Mark Judge, a data systems engineer at Lockheed Maritime Systems Center of McLean, Va. (see story above). "The reason was the quality of the color, the price and the speed of the printer output."

**Hybrid technology.** Tektronix added a new wrinkle to inkjet printing with the introduction of its Phaser III PXi printer. The Phaser is marketed as a "phase-change" inkjet: It uses four solid ink sticks, which are melted into liquid inks, squirted onto the page, then fused for durability.

It can print well on plain paper and, according to Tektronix, creates superior transparencies. The output resembles that of a thermal-wax printer.

With a list price of $9,995, however, the Phaser must compete with dye-sublimation printers as well as thermal-wax devices and lower-quality inkjets. Now that it and several vendors have introduced comparable dye-sublimation devices for as low as $8,000, that may not be easy. In fact, Tektronix has recently discontinued the earlier Phaser II PX series of printers.

**Still optimistic.** Although the vendors and many users seem to be less than enthusiastic about both the present and the future of color inkjet printing, some analysts are not so sure it's down for the count.

"We think [the demand for] inkjet has just barely begun," said Bill Flynn of Norwell, Mass.-based BIS Strategic Decisions Inc. According to Flynn, there is a lot of elasticity left in inkjet pricing.

"Right now, with so few companies selling inkjets, there's not much competitive pricing," he said. "But there's no reason someone with their own inkjet technology can't outsell low-end laser printers.

"Inkjet is also going through continuous cycles of improvement in speed, waterfastness and appearance," Flynn said. "The inks are improving. If a business uses color only occasionally, then it should probably go with an inkjet. Inkjet can beat everything on price." □

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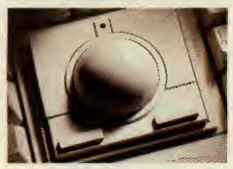

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## Thermal wax

*From Page 57*

Color 350 printer based on both price and performance.

"I'm the in-house advertising, graphic design and trade-show person, all in one," Brown said. "We do our own slide presentations here, and although we have the slides imaged outside, we do our own overheads and handouts. I looked at Tektronix's thermal printers, and it wanted more for an 8.5-by-11-inch printer." The RealTech 350 outputs edge-to-edge, 300-dpi prints in letter or tabloid sizes. Equipped with a 16-MHz RISC processor, 39 built-in fonts and 10 Mbytes of RAM, the upgradable printer also features a PostScript clone interpreter and Pantone-approved color matching.

Best of all for future buyers, thermal-wax prices are likely to dip even lower, driven down as competing dye-sublimation printer prices drop below $10,000.

"With anything I've done in Adobe Illustrator with blends, the dithering is very nice in its output," Brown said. "It doesn't have the banding that some of the other thermal-wax printers I've used had.

"I also like the fact that it prints oversize sheets, so I can do a full-bleed, two-page spread," he said. Brown said that he personally tested several competing models before making his purchase decision, an important step that he recommends to other prospective buyers.

**Speedy results.** Seiko's Personal ColorPoint PSE was the choice of Ed Veldin, manager of patient care information systems at Fresno Community Hospital in Fresno, Calif.

"We have a color inkjet printer, but it only gets up to 180 dpi, and when we do transparencies the ink always looks faded out," he said. Veldin wanted a printer that could handle a high volume of in-house presentation materials, most of which include color text and graphics.

His department provides transparencies, handouts, short-run "instant" manuals and other items to staff members when the hospital introduces new equipment or concepts in patient-care procedures.

Often its projects include producing multiple sets of documents for training sessions, so his color printer had to be ready for a serious daily workout.

Seiko's RISC-equipped, 300-dpi device comes standard with 5 Mbytes of RAM and 39 resident fonts. Depending on the color cartridges chosen, it can produce true or composite blacks, and it can print on high-quality plain paper, which produces some cost savings.

Having the ColorPoint has allowed him to apply color in places where he might not have before, Veldin said. "We just recently sent out an RFP (request for proposal) with full-color charts, bit-mapped graphics, pictures of our facility, maps and all sorts of other things vendors need to bid on our project," he said. According to Veldin, using color in this document made the information richer and easier to understand.

**Color consistency.** Although Veldin said he is basically satisfied with the ColorPoint's output quality, he said that improved color-matching capabilities would be most welcome. "When we use it with some programs the colors come out darker on the screen," he said. "Dark blue comes out almost black."

While Veldin has learned to compensate for the printer's eccentricities, he said he hopes future developments in color-correction software will provide a solution.

According to market analysts, support for these color-matching systems is becoming available for most thermal-wax vendors (see story above). Plain-paper thermal printing is likely to gain wider acceptance as well since output costs factor into purchasing decisions.

Best of all for future buyers, thermal-wax prices are likely to dip even lower, driven down as competing dye-sublimation printer prices drop below the $10,000 mark. □

### Vendors bringing color management to the masses

Support for device profiles and accompanying color-management software is a growing trend throughout the color-device market. With some low-end color printers, however, these technologies may have limited utility.

That's OK, according to many business users. Precise correspondence between screen and output is less important for business users than it is for graphic artists, who require precise color matching. According to experts, what business users want are ways to eliminate obvious misprints, such as baby blues that turn navy and blacks that look dark brown.

Color inkjet printers don't feature the precision ink controls of their more-expensive cousins. Thermal-wax printers, with their multistep printing process, offer more opportunities for calibration and control. Both, however, can benefit from emerging color-management products.

Eastman Kodak Co.'s recently released ColorSense calibration and correction package, for example, includes device profiles for Tektronix Inc.'s Phaser line and Hewlett-Packard Co.'s DeskWriter C, as well as for several thermal-wax color printers.

Using simple on-screen controls, built-in information on output devices and scanners, and a suction-cup device for calibrating your screen, ColorSense gives desktop RGB (red, green, blue) color users access to some fairly sophisticated tools for improving their final product.

Electronics For Imaging Inc., the vendor of the EFIColor Color Management System, is also adding device profiles for a number of low-end, business-oriented printers to its software.

But technologies to be embedded in future versions of Apple's system software will likely provide good enough color for most business users, said Bill Flynn, an analyst with BIS Strategic Decisions Inc. of Norwell, Mass.

"As we start seeing more people use color in applications where it's not critical," he said, "color management will probably be built into the software, like QuickDraw GX."

According to Flynn, development will be driven by improvements at the upper level. "For color professionals, where real color matching is a very serious issue, they'll be getting more advanced tools," he said. "Similar to what we've seen in other types of software, we'll see the best of the add-on ideas folded into the operating systems, making them available to users down the line." — By Mitzi Waltz

## Product Info

CALCOMP INC.
**CalComp ColorMaster Plus 6603PS:** $4,995 (letter-size)
**ColorMaster Plus 6613PS:** $6,995 (tabloid)
2411 W. La Palma Ave., Anaheim, Calif. 92801
Phone (714) 821-2000 or (800) 225-2667
Fax (714) 821-2714

EASTMAN KODAK CO.
**ColorSense:** $499
901 Elm Grove Road, Rochester, N.Y. 14653
Phone (716) 253-0740 or (800) 344-0006
Fax (716) 726-3108

ELECTRONICS FOR IMAGING INC.
**EFIColor Color Management System:** $495
2855 Campus Drive, San Mateo, Calif. 94403
Phone (415) 286-8564 or (800) 285-4565
Fax (415) 286-8686

GENERAL PARAMETRICS CORP.
**Spectra*Star Q10e:** $3,799
**Spectra*Star Q10:** $4,999
1250 Ninth St., Berkeley, Calif. 94710
Phone (510) 524-3950 or (800) 223-0999
Fax (510) 524-9954

HARDWARE THAT FITS
**RealTech Color 350:** $5,995
610 S. Frazier, Conroe, Texas 77301
Phone (409) 760-2400 or (800) 364-3487
Fax (409) 539-4141

HEWLETT-PACKARD CO.
**LaserJet 4M:** 2,399
**PaintJet XL300:** $2,795
**with PostScript Level 2:** $3,995
**PaintJet:** $885
**DeskWriter 550C:** $879
**DeskWriter C:** $619
**DeskJet 550C:** $879
**DeskJet 500C:** $619
**DeskJet 12000/PS:** $2,399
19310 Pruneridge Ave., Cupertino, Calif. 95014
Phone (800) 752-0900

POLAROID CORP.
**Polaroid TX-1500:** $3,995
575 Technology Square, Cambridge, Mass. 02139
Phone (617) 577-2000 or (800) 225-1618
Fax (617) 577-5718

QMS INC.
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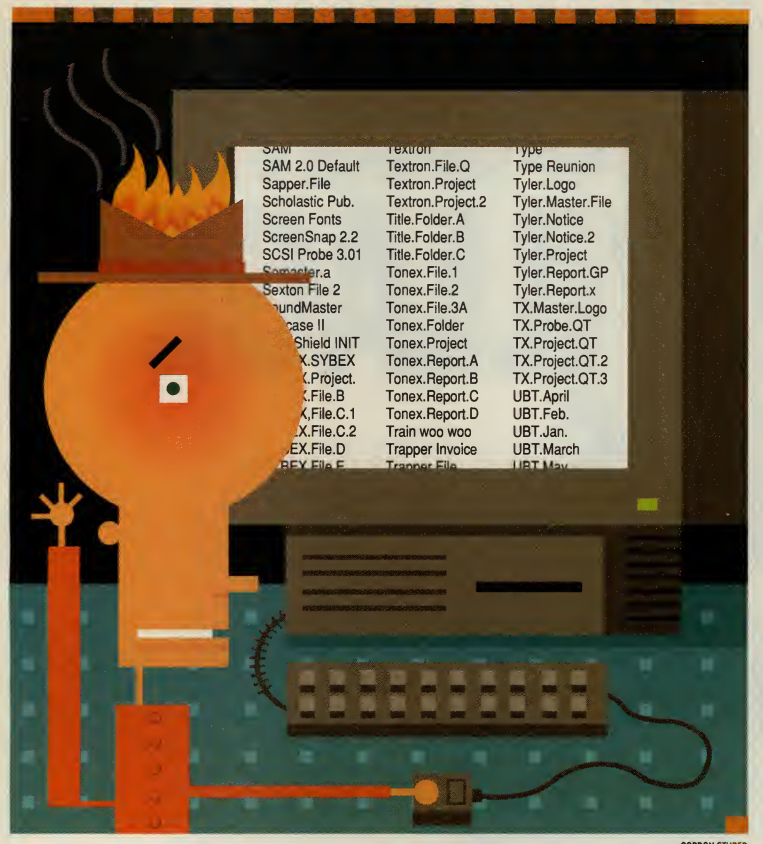

GORDON STUDER

**MacInTouch** RIC FORD

# Finessing the Finder for a faster desktop

Careful attention to settings can help Finder 7's performance when managing long lists of files. On floppies, the Finder's invisible Desktop file is tricky, too.

BUGS & TIPS

**Finder sensitivities.** More so than Finder 6, Finder 7 is a bit fickle, and it needs proper care and feeding to perform well. Given the right environment, it handles most chores adequately, but configuring the desktop carelessly can slow its pace to a dawdle or produce bizarre effects.

List views are a critical part of the modern Macintosh desktop, as hard disks have grown in size to hold thousands of files, and Finder 7 introduced more dynamic behavior for managing these lists.

Clicking on column headers now provides instant sorting (by name, date, etc.) and, more importantly, outline-style "handles" provide a means of showing or hiding each folder's contents within the list.

Several factors determine the speed at which list views scroll and display, and performance can get downright poky if you are not careful, even on machines such as the Mac IIfx.

**Tuning tools.** Fine-tuning the Finder starts with its control panels. The Views control panel sets two important parameters: the size of icons in list views and whether or not the Finder displays the disk space used by each folder in lists.

Switching from the smallest (generic) icons to the medium-size (application-specific) icons slowed down scrolling by about 20 percent to 25 percent in a small series of tests I ran. The difference is enough to be noticeable.

Displaying folder sizes adds a substantial amount of extra disk activity, but the Finder gives other tasks priority during this process, so it avoids crippling performance when the option is enabled.

The Monitors control panel is another one that has a significant effect on the Finder's performance.

Like other applications, the Finder is slowed by the extra data load that goes along with larger bit depths. Cutting back from 24-bit or even eight-bit color to black and white adds quite a bit of extra snap to desktop operations.

Surprisingly, disk cache settings in the Memory control panel seem to have little effect on the Finder's performance. Switching from 96 Kbytes to 512 Kbytes of cache failed to improve scrolling speed at all in the tests I ran using various icon sizes and color depths.

**Outside the envelope.** In Finder 7, you can select all the folders in a window and expand their outlines with one stroke, using the key combination Command-Option-right arrow.

When I did this on a disk volume with about 1,500 files, the vertical scroll bar disappeared. Various tricks, such as zooming the window, made the scroll bar visible momentarily, but a slew of problems occurred with the display until the folder outlines were again collapsed.

The disk window also opened much more slowly with an expanded list inside, taking five times longer than it did with the list collapsed.

Of course, it would be unusual to keep an entire disk window fully expanded like this, but the moral of the story is that the Finder works better the tighter its list views are compacted.

**Desktop dilemmas.** A few extra kilobytes of space can make a big difference in trying to squeeze a set of files onto a floppy. A critical factor is the invisible Desktop file, which the Finder maintains as its private repository of information about file creators, icons and such.

Finder 7 uses the same Desktop file as Finder 6 on floppies, although it switches to a new desktop scheme (with invisible Desktop DB and Desktop DF files) for volumes larger than 2 Mbytes.

This Desktop file can use up scores of kilobytes on a floppy disk, even after all files have been trashed. Using the Finder's Erase Disk command will rebuild the Desktop file at its minimum size, 1 Kbyte, recovering the lost space.

A faster approach is to rebuild the Desktop file by inserting the floppy while holding down the Command and Option keys, then answering OK to the dialog box that appears.

A strange Finder 7 quirk prevents this technique from working if there are no files on the floppy. With one or more files present, however, the process successfully rebuilds the file and recovers the space.

**Duo parking lot.** Readers have brought up an issue, unrelated to the Mac file-system bug, with the IBM drive used in PowerBooks and Duos.

This drive apparently has a "parking" feature that moves the disk heads away from the platter after only a few seconds of sleep.

The resulting clicking noise and extra spin-up delays, when the PowerBook is in a power-conserving mode, can be annoying, say the correspondents.

**Maladjusted keyboards.** The new Apple Adjustable Keyboard works only partially without its special software. Try reinstalling the software if you encounter problems such as modifier keys (Command, Option, Shift) not having any effect on the actions of keys located on the separate key pad. □

*Comments on MacInTouch are welcome at 7 Parmenter Ave., Maynard, Mass. 01754. Phone (508) 897-2621. Address electronic mail to RICFORD on AppleLink or MCI Mail; to 72511,44 on CompuServe; or on the Internet to 72511.44@compuserve.com. Join us on-line in the MacWEEK Forum at location ZMC:MACWEEK on CompuServe or ZiffNet/Mac.*

**Ask David Ramsey**

## Caffeine can be your friend

**Q. Why do programmers drink so much cola?**

**A.** Because, as I can attest, they simply work better with a nice caffeine buzz. It's frightening to consider the computer systems we'd have to work with if caffeine were not as cheap and readily available as it is. If it were introduced today, it would certainly be a controlled substance.

For the technical details, I turned to the Ask David Ramsey medical consultant, Dr. Bob Seaver, who said that caffeine is one of the methylated xanthines, a group of related compounds that includes theophylline in tea and theobromine in cocoa. Caffeine is a potent stimulant and diuretic and is also addictive, just like tobacco and heroin (if not to the same degree).

Caffeine makes you smarter — people dosed with caffeine perform significantly better on standardized tests. There seem to be no adverse consequences associated with long-term use, although one imagines that the soft-drink and coffee lobbies would act to keep any reports that showed otherwise from reaching the public. However, short-term effects are noticeable when you quit: As little as one cup of coffee a day is enough to assure you of headaches, sleepiness, irritability and such should you try to kick the habit. These symptoms can persist for up to a week.

Most programmers prefer colas because the caffeine dosage can be precisely controlled, and these drinks (or at least nondiet versions) also contain simple carbohydrates, such as glucose and high-fructose corn syrup, which gives a synergistic effect: Caffeine for the immediate mental boost and sugar so your body can keep up. If they'd mix in some broccoli to provide the complex carbohydrates necessary for endurance, Coke Classic could be perfect!

A 12-ounce cola typically has 40 to 50 milligrams of caffeine. A cup of brewed coffee has about 115 milligrams, significantly more than the touted Jolt Cola, which has 70 to 100 milligrams. A dose of NoDoz (two tablets) weighs in at a whopping 200 milligrams, an amount recommended only for marathon programming sessions.

*Please send questions to David Ramsey on CompuServe: 76702,335 or to Ask David Ramsey, c/o MacWEEK, 301 Howard St., 15th Floor, San Francisco, Calif. 94105.*

Script Manager

# How will AppleScript release affect the future of Frontier?

STEVE MICHEL

Now that AppleScript is being released to developers, it's time to take a look at how it has shaped up since the beta version and present two more important features of the software.

**Stored values.** It's important that a script be able to "learn" things. As it's running, for instance, a script may ask the user for some information, but without a way to store this information, the script would have to ask the user the same question over and over again. Alternately, the scriptor could hard-code the information into the script, but this can make a script brittle.

An AppleScript script that has been saved as compiled code stores values inside the script when it exits. For instance, a drag-and-drop script application could keep track of the files that were dropped on it, across launches.

Data can be stored as properties inside lists, which are called records. For example, a record for a file would include its name, size, creator, the date it was created and so on. All the information for a file can be gathered with one command, and the various properties can be extracted later by name. Scriptors can also develop their own data structures in records.

Records are pretty powerful. In a way, they are like HyperCard containers because they are delimited — that is, they have separate items in them — but they are more powerful. It's easier to extract data from a record than from a container, and any individual property of a record can be a list itself, something that was nearly impossible in HyperCard.

**Reusable code.** The release version of AppleScript lets scripts load other scripts into memory as script objects and then call those scripts. Thus, a large script could contain many handlers that would be available to other scripts with a few simple commands. This modularity doesn't appear to be as elegant as HyperCard's Home stack script, where the code is available with virtually no overhead, or as handy as UserLand Frontier's method, which makes it easy for scriptors to extend the language with other scripts.

**The Frontier question.** One of the questions I am asked most often is how AppleScript will affect Frontier: Will — or should — people continue to buy Frontier once AppleScript is out?

Frontier has several advantages over AppleScript. First, UserLand Software Inc.'s support via phone and on-line services is terrific. This support includes a large number of sample scripts and help for common scripting problems. It also includes a number of ancillary programs, such as the DocServer application, which provides on-line help for Frontier verbs. Just as important, UserLand has extended the reach of Frontier through utilities such as the Runtime package and FinderMenu tools.

And using Frontier doesn't mean turning your back on AppleScript. Frontier will support the Open Scripting Architecture of AppleScript, meaning that you will be able to use Apple's Script Edit application to write Frontier scripts (although why you'd want to, I can't imagine) and edit AppleScript scripts from within Frontier (a little more likely). Further, there's nothing stopping UserLand from implementing property lists compatible with AppleScript's lists. And with its scripts stored in its object database, Frontier doesn't need to use the Load Script commands for shared code.

My guess is UserLand will be somewhat relieved now that AppleScript is being released. It's easier for the company to compete with a real target than with people's estimation of an unknown.

**Send me your scripts.** With next month's column, I'll start presenting AppleScript sample code, which I'll also post on-line. I'm interested in seeing any useful or interesting scripts other people have developed, as well as the applications that use it. □

*If you have any user scripting comments or questions, contact me on ZiffNet/Mac (72511,151), AppleLink (SMICHEL), or at MacWEEK's mailing address.*

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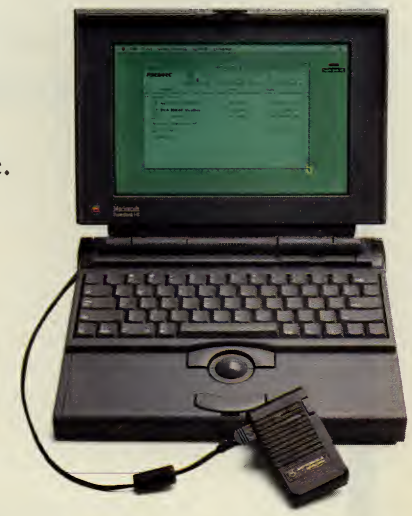

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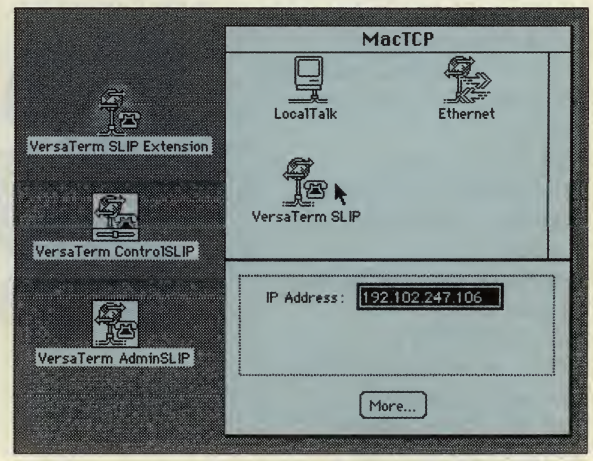


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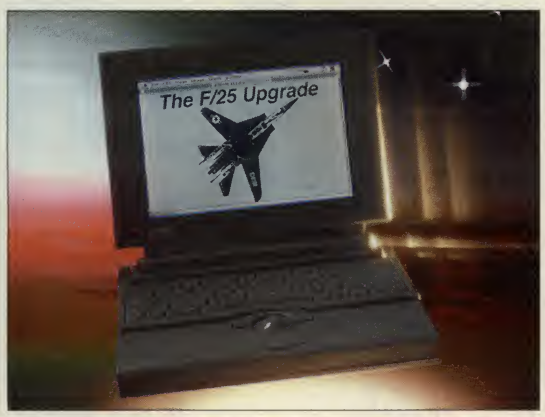


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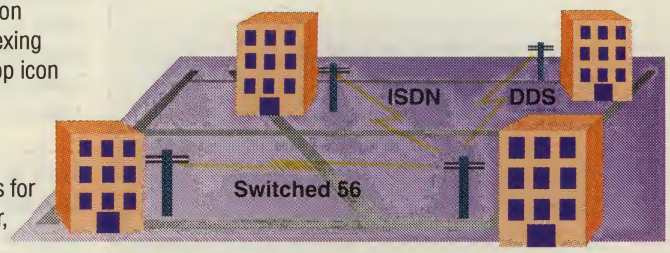


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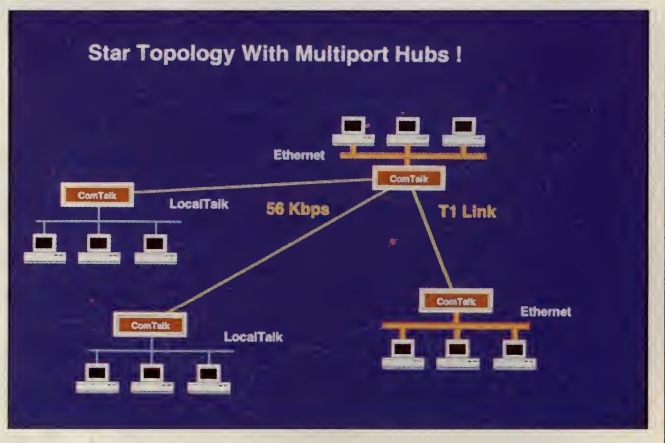


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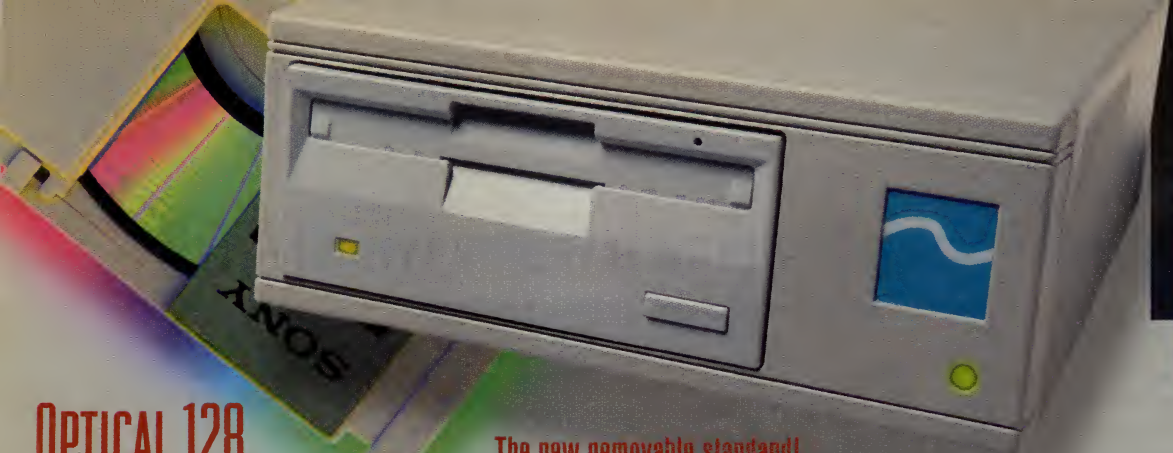

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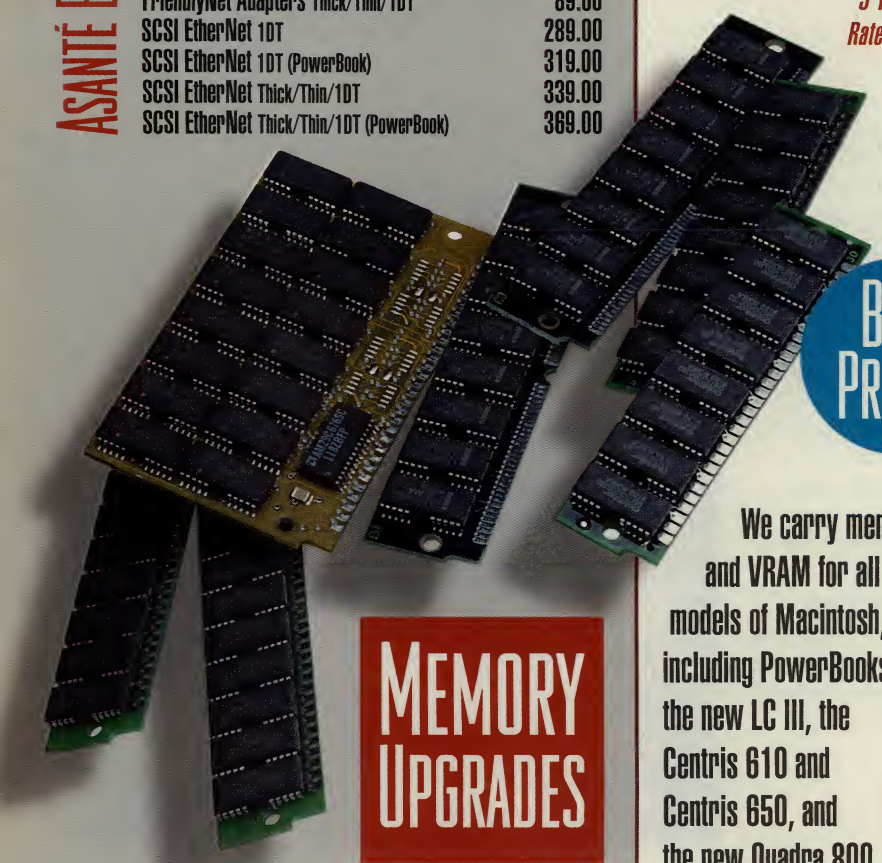

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10130...525 MB Pro Drive 5yr warranty .....998
10145...700 MB Pro Drive 5yr warranty ....1215
10141...1225 MB Pro Drive 5yr warranty ..1649
Bracket w/cable (specify computer).....10
Bracket w/cable/Quadra 900/950.....20

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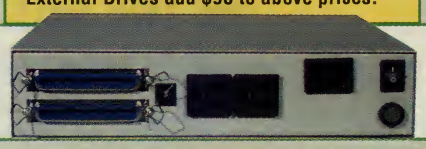

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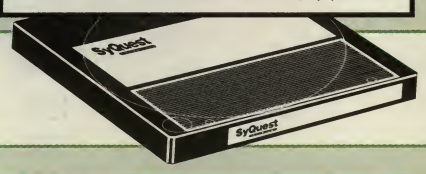


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10604 .MultiDisk Cartridge 35 MB.....49
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10602 .MultiDisk Cartridge 150 MB .....149

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6148 ...Sony 3.5" 800k Disks .....(30) .....25
3298 ...Sony 3.5" FDHD Disks .....(10) .....14
6375 ...Sony 3.5" FDHD Disks .....(30) .....39
2214 ...Fuji 800k Disks .....(10).....9
2242 ...Fuji 800k Disks .....(50) .....32
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2241 ...Fuji FDHD Disks .....(50) .....59

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2865 ...PLI - 21 MB Floptical Cart .....(1).....27
2899 ...PLI - 21 MB Floptical Cart ....(10) ...245
3016 ...PLI - 512 MB -5.25" Media ..(1) ....129
11524...Sony - 3.5" 128 MB Optical.....59
11523...Sony - 5.25" 1024 MB Optical .....139
11522...Sony - 5.25" 512 MB Optical .....139

### Komag Optical

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10439 ..Komag - 128, 3.5" Optical ...(1)....39
10441 ..Komag - 128, 3.5" Optical ..(10).339

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3943.....3M - 40 MB Tape Cartridge.....17
1603.....Sony - DG60m DAT Tape Cartridge .16
2520.....Sony - DG90m DAT Tape Cartridge .16
7671.....TEAC - CT600H 60 MB Cartridge.....16
7672.....TEAC - CT600N 150 MB Cartridge ...24
7673.....TEAC - CT600F 600 MB Cartridge....36

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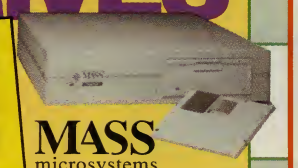

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5434.....2400/96 S/R fax w/QuickLink II....106
11044...PM9600MT 96/96 S/R fax, V.32bis..209
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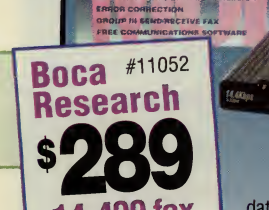

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7757.....FaxModem AFX - 24/96/S, 48/R.....74
3576.....FX9624V 24/96 S/R fax, V.42, V.42bis ..127
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2199.....(4) 1 MB SIMM - 80ns/30-pin .....148
4201.....(2) 1 MB SIMM for Mac IIfx.....78
7497.....(4) 1 MB SIMM for Mac IIfx.....156
9437.....(1) 2 MB SIMM IIsi, LC, LC II, IIci....69
7437.....(1) 4 MB SIMM - 80ns/30-pin .....154
7600.....(4) 4 MB SIMM - 80ns/30-pin .....569
7599.....(4) 4 MB SIMM for Mac IIfx.....599
9536.....(4) 4 MB SIMM for Mac II, IIx.....619

**New memory for the LC III, Centris 610/650**
11151...(1) 4 MB SIMM - 72-pin/70ns .....149
11152...(1) 8 MB SIMM - 72-pin/70ns .....299
11153...(1) 16 MB SIMM - 72-pin/70ns .....649

**New memory for the Quadra 800**
11492...(1) 4 MB RAM 72-pin 60ns.....179
11493...(1) 8 MB RAM 72-pin 60ns.....349
11494...(1) 16 MB RAM 72-pin 60ns.....759

**PowerBook & Duo RAM**
10341....4 MB RAM Duo 210/230.....215
10340....8 MB RAM Duo 210/230.....409
9424.....4 MB RAM PB 160/180.....219
9426.....6 MB RAM PB 160/180.....319
9427.....8 MB RAM PB 160/180.....429
9446.....10 MB RAM PB 160/180.....499
3742.....2 MB RAM PB 100/140/145/170 .....99
5090.....4 MB RAM PB 140/145/170.....189
5091.....6 MB RAM PB 140/145/170.....259
11656....4 MB RAM PB 165c, 85ns .....219
11655....6 MB RAM PB 165c, 85ns .....289
11654....8 MB RAM PB 165c, 85ns .....399
11653....10 MB RAM PB 165c, 85ns .....499

**$122**

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**PowerBook Starter Kit**
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10390.....PowerBook Starter Kit .....122
7562.....Battery 140/145/160/170/180 ....62
10392.....Charger 140/145/160/170/180...94

## PowerBook Gear

**Connectix** **30 day MBG**
8441.....CPU PowerBook Utilities .....49
**Double Case** **30 day MBG**
10303...PowerBook Hard Case.....115
10306...PowerBook Hard Case w/space.....139
**Envisio**
1835.....Notebook Display Adapter 4 MB ...929
**Kensington** **60 day MBG**
5976.....PowerBook Keypad (+$20 rebate) ...79
11551...Enhanced PowerBook Keypad.....99
11550...Adding Machine Software .....25
**Symantec** **30 day MBG**
1199.....Norton Essentials PB.....87

## RasterOps

**Sweet 16 System**
This is a 16" color monitor bundled with the 24MX video card. The 16" monitor has a high resolution RGB picture tube with a resolution of 624 x 832 pixels and the monitor face has an anti-glare treatment. The 24MX is a 24-bit NuBus video card. It has a built-in QuickDraw accelerator and 2 MB of VRAM on-board, upgradable to 16 MB of off-screen memory. This bundle has a three-year warranty.
#7699 **$1999**

8392.....Sweet 16 Color Monitor .....1249
7703.....Sweet 16 Live Video System - 16" color monitor with the 24MXTV .....2599
7695.....24MX - 24-bit for up to 16".....1249

**20T MultiScan Trinitron**
This is a 20" monitor with a Trinitron tube. It has a 90° deflection angle, 3mm dot pitch, an anti-glare screen coating, automatic degaussing, up to 1280 x 1024 resolution (non-interlaced), color temperature, and GAMA control.
#11575 **$2699**
8039.....PaintBoard LI - 24-bit video for 20" ...929

## radius

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**Use Built-In Video of PowerBook 160 & 180, Macintosh IIci, IIsi, LC III and up!**
This 15" full page monochrome display is a low cost, high resolution monitor that allows you to view a full page of text or graphics without reducing or scrolling (image size 8.1" x 11"). Take advantage of the on-board video of the Macintosh IIci, IIsi, LC III, Quadra, and Centris computers as well as the PowerBook 160 and 180. It displays 640 x 870 at up to 8-bits of greyscale. The monitor face has an anti-reflective etch with an anti-static treatment. This monitor comes with a one-year warranty.
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# Hot Hard Drive Prices From Mac Direct!

**Fujitsu Specials!**
520mb 3.5" Internal $848
1.2 Gig 5.25 Internal $1298
2.4 Gig 5.25 Internal $2448

## Conner Drives

| | | Internal | External |
|---|---|---|---|
| C 42 MB | 3.5" LPS, 2 yr warr,150,000 MTBF | $168 | $218 |
| C 85 MB | 3.5" LPS, 2 yr warr,150,000 MTBF | $198 | $258 |
| C 120 MB | 3.5" LPS, 2 yr warr, 150,000 MTBF | $248 | $308 |
| C 170 MB | 3.5" LPS, 2 yr warr, 150,000 MTBF | $288 | $348 |
| C 212 MB | 3.5" LPS, 9ms, 2 yr warr, 150,000 MTBF, Fast SCSI | $368 | $428 |
| C 540 MB | 3.5" 8.5 ms, 2 yr Warr,150,000 MTBF, Fast SCSI | $898 | $958 |

These new Conner drives are so reliable, that Conner has been one of Apples largest suppliers of drives. The 150,000 hours Mean Time Between Failure and the incredible speed of the 540 are just two reasons to buy a Conner.

## Fujitsu Drives

| | | Internal | External |
|---|---|---|---|
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| 1.1 Gig | 3.5" 8.5ms, 5yr warr, 300,000 MTBF, Fast SCSI | $1598 | $1658 |
| 1.2 Gig | 5.25" 11.5ms, 5yr warr, (MacWorlds Fastest Gig!) Fast SCSI | $1288 | $1388 |
| 2.06 Gig | 5.25" 11.5ms, 5yr warr, 300,000 MTBF, Fast SCSI | $2288 | $2388 |
| 2.4 Gig | 5.25" 11.5ms, 5yr warr, 300,000 MTBF, Fast SCSI | $2448 | $2548 |

*Mean Time Between Failure is the average life expectancy of a drive.

## Toshiba Drives

| | | Internal | External |
|---|---|---|---|
| 1.2 Gig | 3.5" 12.5ms, 256 cache, SCSI-2, Internal for CI,Quadra | $1248 | $1298 |
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- 213mb inside your PowerBook!
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- Fastest drive available for the PowerBook,
- Only 0.12 watts power usage in sleep mode and 3.0 during access

Internal kit ..... $688
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PowerBook Cable ..... $30

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| 1.2 Gig Wren 7 | 5.25" 15ms, 1 Yr warranty | $1258 | $1358 |
| 1.6 Gig Wren 8 | 5.25" 15ms, 1 Yr warranty | $1748 | $1848 |
| 2.1 Gig Wren 9 | 5.25" 12.5ms, 5 Yr warranty | $1948 | $2048 |
| 1.6 Gig Elite 1 | 5.25" 11.5ms, 1 Yr warranty | $1898 | $1998 |
| 2.4 Gig Elite 2 | 5.25" 11ms, 5 Yr warranty | $2598 | $2698 |
| 3.4 Gig Elite 3 | 5.25" 11ms, 5 Yr warranty | $3498 | $3598 |

## CD ROM Drives from Toshiba

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NU DESIGN

## Optical Drives *from NuDesign*

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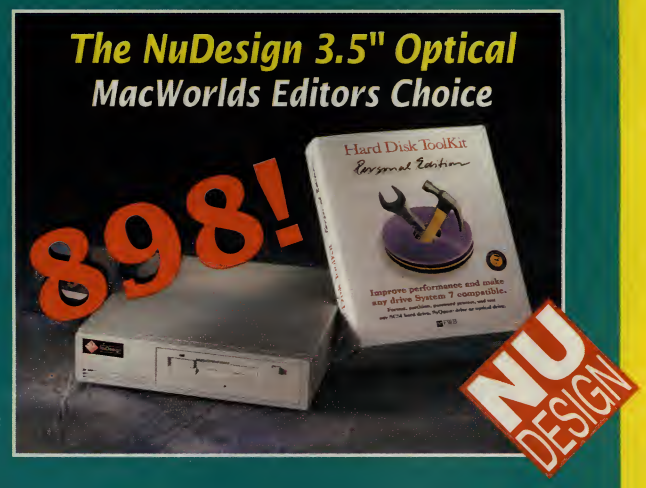


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**8 Bit Color System.....$998.00**
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- The SAMPO is a high quality display without the high cost!
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- Display supports all Mac's
- Resolution 1024 x 768 at 72 DPI

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**Monitor Only for Quadra & Centris.....$1898.00**
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- Display supports all Mac's

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- Plug compatible SI, CI, LC's at 640x480

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- 1 Bit System available for all macs 488.00

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$515

Memory for LCIII, Centris 610, 650

4mb....Call 8mb.....Call
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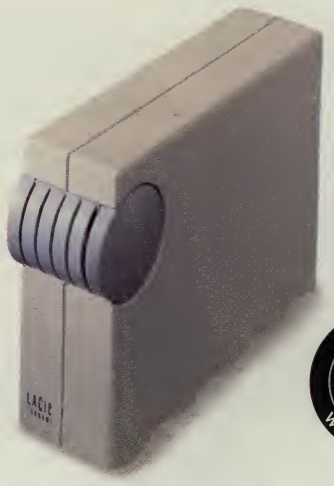

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| 120MB (3½") | $349 | $409 | $469 |
| 127MB (3½") | $249 | $309 | $369 |
| 170MB (3½") | $279 | $339 | $399 |
| 240MB (3½") | $369 | $429 | $489 |
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| 1.2GB (3½") | $1489 | $1549 | $1609 |
| 80MB (2½") for Powerbook | $299 | See PocketDrive | |
| 120MB (2½") for Powerbook | $389 | See PocketDrive | |
| 160MB (2½") for Powerbook | $499 | See PocketDrive | |

| *Seagate* | Internal | ZFP+ |
|---|---|---|
| 1.6GB (5¼") | $2299 | $2449 |
| 2.1GB (5¼") | $2949 | $3099 |
| 2.4GB (5¼") | $3299 | $3449 |

| *HP* | Internal | ZFP+ |
|---|---|---|
| 1.6GB (5¼") | $2459 | $2609 |

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Pack it in your pocket, purse or briefcase. PocketDrives offer convenient desktop connection at a great price.

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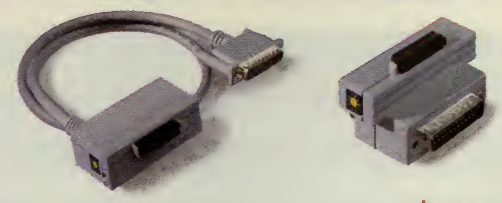

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| Optional PocketDock Cable | $59 |
| Extra T-Connector | $59 |
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## *Powerbook Internals*

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Our quiet Cirrus Optical drives offer 128MB removable media storage, compact portability and fast 38ms performance. Includes one free cartridge ($79 value).

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| Drive with Retrospect | $1499 | $1599 |
| 128MB Optical Disk | | $79 |

*While supplies last

## Cirrus Backup

Our Cirrus backup solutions have the power to handle large backup jobs. Includes Retrospect™ and 1 free tape.

| | Internal | External |
|---|---|---|
| 155MB Tape Drive | | $629 |
| 600MB Tape Drive | $799 | $919 |
| 1.3-2.0GB DAT | $1439 | $1559 |
| 4-8GB Comp. DAT | $1549 | $1649 |

88C Now Available!

## ZFP Removable

Our 44-88MB removable media drives deliver Syquest technology in a zero footprint case. Includes 1 free cartridge.

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| 44MB Drive | $599 |
| 88MB Drive (88C) | $719 |
| 44MB Cartridge | $79 |
| 88MB Cartridge | $119 |

## ExpressDrive™

Here's tight security and portability. La Cie Express Drives offer removable drive convenience and Quantum quality.

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| ExpressDrive Chassis | $399 |
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# ON THE
# OPTICAL TE

## THE DEC DSP-3105 1-GIG DRIVE

Introducing the DEC DSP-3105 1-gigabyte drive. This Eddy award-winning monster moves like Ricochet Rabbit on double espresso. It's the world's fastest 3.5 inch drive. Thanks, in part, to a 5400 RPM spindle speed and a whopping 512K drive cache. With our minimum-footprint Cyclone™ enclosure, and a great price, and 5-year warranty, no one can touch it for value. Says MacUser: "It's a dream drive."

| | |
|---|---|
| **Cyclone enclosure** | **$1799** |
| **Classic-style footprint enclosure** | **$1749** |
| **Internal** | **$1699** |

## SPIN CYCLONE 3.5 OPTICAL DRIVE

We've accomplished two firsts. The first is that this is our first optical drive. The second first, even more exciting than the first first (maybe we should have put the second first first), is that this is the first second-generation optical drive for under a thousand bucks. It uses ISO standard 128 MB 3.5 cartridges, so you can use them with other drives. And it comes with our premium Cyclone small-footprint, "brick" enclosure. Plus a two year warranty. So, you ask, "Should I try it first?" In a second.

**Cyclone 3.5 Optical Drive** **$999**
Extra Cartridges: $35

## SPIN DOUBLE SPEED CD ROM DRIVE

If you guessed that by spinning a CD at twice the speed, the Toshiba XM 3401 drive mechanism inside this Spin CD ROM drive can access data twice as fast, that expensive college education isn't going to waste. In fact, it breaks the 200 msec access time barrier. And offers sustained transfer rates of 330 KB/sec. Other CD ROM drives are left with their jaws hanging wide open. This drive is your best choice if you're running Quicktime® movies, photo CD, or multi-media apps. Pretty smart.

**Spin Double Speed CD ROM Drive** (External only) **$499**

## CYCLONE DAT DRIVES

If you're looking for DAT, you'll love dis. Cyclone DAT drives. They feature the zephyr-like Wang DAT drive mechanism – the industry standard for reliability. Our own Cyclone small-footprint chassis. And a price that won't dis you. Our standard Cyclone DAT drive has a 2.0 GB capacity. The compression model, up to 5 gigs. Both come with Dantz™ Retrospect back-up software, and a 90-meter DAT tape, free. Dat's all you need.

| | |
|---|---|
| **Cyclone Standard DAT** | **$1199** |
| **Cyclone Compression DAT** | **$1349** |

# ORDER DIRECT. CALL:

# A NEW SPIN
# LATEST
# ECHNOLOGY.

## SYQUEST 5110C 88/44 DRIVE

You want to upgrade your removable drive to 88 megs, but you've got a shelf full of old 44s staring you in the face. You have two options. One, use the old cartridges as coasters at geek cocktail parties. Or two, buy the new Spin Syquest 5110C drive that reads and writes both 44 and 88 meg cartridges. True, this drive does not format 44 MB cartridges, but we have a way around that – pre-formatted 44s.

| | |
|---|---|
| Syquest 5110C 44/88 Drive | $589 |
| Syquest 88 MB Removable | $489 |
| Syquest 44 MB Removable | $389 |
| **Syquest Media** | |
| Unformatted 44 MB | $61 |
| Unformatted 88 MB | $99 |
| Formatted 44 MB | $85 |
| Formatted 88 MB | $139 |

## ZERO FOOTPRINT DRIVES

We've gotten letters lately – mostly in crayon – from a few folks asking why we call these drives "zero footprint" when they obviously exist in three dimensions and take up space. We'd like to point out that when placed under your Plus or Classic or SE it takes up no more space than the computer already does. Zero. Neat trick, huh? Our sturdy zero-footprint drives feature a number of different mechanisms from makers like Conner, Quantum, Toshiba. Check the matrix below for the capacity you need. And please, put down that crayon.

| Capacity (MB) | Model Number | Average Access Time (msec) | Transfer rate (K/sec) | MTBF (Hours) | MFG warranty (months) | Internal Drive Price | External Drive Price | Cyclone Drive Price |
|---|---|---|---|---|---|---|---|---|
| **Conner** | | | | | | | | |
| 85 | CP-30080E | 16 | 1300 | 150000 | 24 | $199 | $269 | |
| 120 | CP-30100 | 16 | 1300 | 150000 | 24 | $269 | $339 | |
| 170 | CP-30170E | 16 | 1400 | 150000 | 24 | $279 | $359 | |
| 213 | CP-30200 | 15 | 2000 | 150000 | 24 | $349 | $419 | |
| **Quantum** | | | | | | | | |
| 85 | ELS 85S | 17 | 1800 | 250000 | 24 | $199 | $269 | |
| 127 | ELS 127S | 17 | 1800 | 250000 | 24 | $269 | $339 | |
| 170 | ELS 170S | 17 | 2000 | 250000 | 24 | $299 | $369 | |
| 240 | LPS 240S | 16 | 2300 | 250000 | 24 | $399 | $469 | |
| 80 (Pwrbk) | GRS•80 | 17 | 1900 | 150000 | 12 | $349 | | |
| **Toshiba** | | | | | | | | |
| 210 MB (Pwrbk) | MK-2224 | 12 | 1800 | 150000 | 12 | $549 | | |
| 1.2 GB | MK-538 | 12 | 2800 | 250000 | 36 | $1149 | $1199 | $1249 |
| **DEC** | | | | | | | | |
| 1.05GB | DSP-3105 | 9.5 | 2600 | 250000 | 60 | $1699 | $1749 | $1799 |
| **Seagate** | | | | | | | | |
| 456MB | ST-355ON | 12 | 3500 | 250000 | 36 | $849 | $899 | $949 |
| 1.05GB | ST-1120ON | 10.5 | 3200 | 200000 | 60 | $1199 | $1249 | $1299 |
| **Fujitsu** | | | | | | | | |
| 520MB | M2624FA | 9 | 2700 | 200000 | 60 | $899 | $949 | $999 |
| 1.06 GB | M2694FA | 9 | 2800 | 200000 | 60 | $1549 | $1599 | $1649 |

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## 30 DAYS TO DECIDE.

**If you're not satisfied, neither are we (we're referring, of course, to Macintosh peripherals only). That's why every Spin product comes with a 30-day money back guarantee. Test-drive any Spin product. Give it a real workout. If you're not happy, return it within 30 days for a refund. Was that good for you?**

## MORE THAN JUST A LOW PRICE.

**Flip through these pages (not right now, it's just a figure of speech), and you'll see a lot of low prices. The difference with Spin is that you get more. And not just a little more. We include many free things that others charge you for. Like a double-shielded SCSI cable. External terminator. A power supply designed for constant use. Not to mention our own Spin Disk Utilities with free upgrades for a year, system software, and unlimited tech support as long as you own a Spin drive. We aim to please. Call one of the other guys and ask what they'll give you for free. The cardboard box? The owner's manual? Then call us back.**

Spin™
PERIPHERALS

381 Elliot Street, Newton, MA 02164-1162
**Phone: 1-617-965-9882 Fax: 1-617-965-6257**

# 1-800-466-1200

VISA MasterCard

MWK419

1-800-258-2622 1-800-CLUBMAC 1-800-258-2622

# Quantum

| Unformatted Capacity | Model | Access Time | Actual MAC Capacity | Internal | External |
|---|---|---|---|---|---|
| **GO•DRIVE (2.5" HARD DRIVES DESIGNED FOR POWERBOOKS)** | | | | | |
| 80mb | GO80 | 17ms | 80mb | $299 | $399 |
| 120mb | GO120 | 17ms | 120mb | $359 | $459 |
| **ELS SERIES (3.5" LOW PROFILE AND LOW POWER)** | | | | | |
| HURRY! WHILE SUPPLIES LAST 42mb | ELS42 | 19ms | 40mb | $169 | $229 |
| 85mb | ELS85 | 17ms | 82mb | $199 | $259 |
| 127mb | ELS127 | 17ms | 124mb | $249 | $309 |
| 170mb | ELS170 | 17ms | 160mb | $275 | $335 |
| **LPS SERIES (3.5" LOW PROFILE)** | | | | | |
| HURRY! WHILE SUPPLIES LAST 105mb | LPS105 | 11ms | 100mb | $215 | $275 |
| 120mb | LPS120 | 10ms | 116mb | $269 | $329 |
| 240mb | LPS240 | 10ms | 234mb | $359 | $419 |
| 525mb | LPS525 | 10ms | 500mb | $899 | $959 |
| **PRODRIVE SERIES (3.5" HALF HEIGHT)** | | | | | |
| HURRY! WHILE SUPPLIES LAST 425mb | PRO425 | 9ms | 406mb | $739 | $799 |
| 700mb | PRO700 | 10ms | 670mb | $1195 | $1255 |
| 1.0GIG | PRO1050 | 10ms | 1001mb | $1325 | $1385 |
| 1.2GIG | PRO1225 | 10ms | 1165mb | $1479 | $1539 |

GO•Drives carry a ONE Year Warranty. ELS drives, LPS drives, PRO drives carry a TWO Year Warranty.

# Maxtor

## *6300 RPM

| Unformatted Capacity | Model | Access Time | Actual MAC Capacity | Internal | External |
|---|---|---|---|---|---|
| **XT SERIES (3.5" LOW PROFILE)** | | | | | |
| 120mb | 7120S | 15ms | 121mb | $225 | $285 |
| 207mb | 7213S | 15ms | 202mb | $329 | $389 |
| **LXT & MXT SERIES (3.5" HALF HEIGHT)** | | | | | |
| 330mb | LXT-340 | 15ms | 324mb | $579 | $639 |
| FAST!! 535mb* | MXT-540 | 8.5ms | 521mb | $899 | $959 |
| FAST!! 1240mb* | MXT-1240 | 8.5ms | 1150mb | $1499 | $1559 |
| **PANTHER SERIES (5.25" FULL HEIGHT)** | | | | | |
| 1.2GIG | P0-12S | 13ms | 997mb | $1249 | $1349 |
| 1.7GIG | P1-17S | 13ms | 1433mb | $1499 | $1599 |

Maxtor drives carry a TWO Year Warranty.

# FUJITSU

FIVE YEAR WARRANTY

| Unformatted Capacity | Model | Access Time | Actual MAC Capacity | Internal | External |
|---|---|---|---|---|---|
| **3.5" HALF HEIGHT** | | | | | |
| 425mb | M2623FA | 9ms | 405mb | $859 | $919 |
| 520mb | M2624FA | 9ms | 496mb | $889 | $949 |
| 1.1GIG | M2694 | 8.5ms | 995mb | $1649 | $1709 |
| **5.25" FULL HEIGHT** | | | | | |
| 1.2GIG | M2266 | 14.5ms | 1029mb | $1329 | $1429 |
| 2.0GIG | M2652 | 14.5ms | 1665mb | $2279 | $2379 |
| 2.4GIG | M2654 | 11.5ms | 2000mb | $2499 | $2599 |

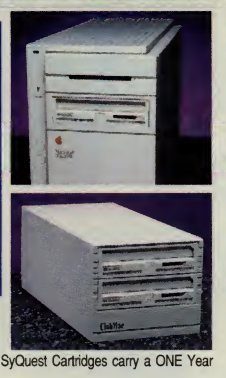
# TOSHIBA

| Unformatted Capacity | Model | Description | Access Time | Actual MAC Capacity | Internal | External |
|---|---|---|---|---|---|---|
| NEW! 213mb | MK2224FB | 2.5" Low Profile | 12ms | 207mb | $589 | $689 |
| 1230mb | MK538FB | 3.5" Half Height | 12ms | 1185mb | $1339 | $1439 |

Toshiba drive carries a ONE Year Warranty.

IN STOCK!! NEW CLUBMAC 3.5" 105MB REMOVABLE

FEATURING SyQuest REMOVABLE TECHNOLOGY



SyQuest Drives include TWO Year Warranty, one cartridge and necessary cables, SCSI Director™ Formatting Utility. Warranty.

SyQuest Cartridges carry a ONE Year Warranty

### CLUBMAC 3.5" 105MB REMOVABLES

| | |
|---|---|
| ClubMac 105mb External (SQ3105A) | $749 |
| ClubMac 105mb Internal (Q900/950) | $719 |

### CLUBMAC 88C REMOVABLES*

| | |
|---|---|
| ClubMac 88c External (SQ5110C) | $579 |
| ClubMac 88c Internal | $549 |
| ClubMac 88c Dual | $1045 |

* ClubMac 88c will read and write 44mb cartridges, but will not format 44mb cartridges.

### CLUBMAC 44MB REMOVABLES

| | |
|---|---|
| ClubMac 44mb External (SQ555) | $385 |
| ClubMac 44mb Internal | $355 |
| ClubMac 44mb Dual | $695 |

### CLUBMAC 88MB REMOVABLES

| | |
|---|---|
| ClubMac 88mb External (SQ5110) | $489 |
| ClubMac 88mb Internal | $459 |
| ClubMac 88mb Dual | $875 |

### SYQUEST CARTRIDGES

| | |
|---|---|
| 105mb Cartridge | $79 |
| 44mb Cartridge | $63 |
| 88mb Cartridge | $97 |

# Seagate

## FEATURING...THE ELITE DRIVES

| Unformatted Capacity | Model | Description | Access Time | Actual MAC Capacity | Internal | External |
|---|---|---|---|---|---|---|
| **3.5" DISK DRIVES** | | | | | | |
| 248mb | ST3283N | Low Profile | 12ms | 235mb | $399 | $459 |
| 1.2GIG | ST11200N | Half Height | 10.5ms | 1000mb | $1239 | $1299 |
| **WREN AND ELITE SERIES (5.25" FULL HEIGHT)** | | | | | | |
| 645mb | ST4767N | Wren Runner II | 11.9ms | 634mb | $1249 | $1349 |
| 1.2GIG | ST41200N | Wren-7 | 15ms | 989mb | $1179 | $1279 |
| 1.6GIG | ST41651N | Wren-8 | 15ms | 1350mb | $1599 | $1699 |
| 2.1GIG | ST42100N | Wren-9 | 12.9ms | 1900mb | $1799 | $1899 |
| 1.6GIG | ST41600N | Elite-1 | 11.5ms | 1307mb | $1839 | $1939 |
| 2.4GIG | ST42400N | Elite-2 | 11ms | 2050mb | $2499 | $2599 |
| 3.4GIG | ST43400N | Elite-3 | 11ms | 2750mb | $3389 | $3489 |

Seagate drives carry a ONE Year Warranty.

# CONNER

| Unformatted Capacity | Model | Description | Access Time | Actual MAC Capacity | Internal | External |
|---|---|---|---|---|---|---|
| 85mb | CP30080E | 3.5" Low Profile | 17ms | 82mb | $195 | $255 |
| 170mb | CP30170E | 3.5" Low Profile | 17ms | 160mb | $275 | $335 |
| 212mb | CP30200 | 3.5" Low Profile | 12ms | 206mb | $355 | $415 |
| 540mb | CP30540 | 3.5"Half Height | 10ms | 515mb | $897 | $957 |

Conner drives carry a ONE Year Warranty.

# ClubMac TAPE BACKUP Systems

### TAPE BACKUP MEDIA

| | |
|---|---|
| 60 METER DAT | $13 |
| 90 METER DAT | $16 |
| CT600N | $19 |
| CT600F | $28 |
| EXABYTE 8MM | $18 |

NOW SHIPPING WITH RETROSPECT V2.0 BACKUP SOFTWARE

| Capacity | Model | Description | Media | Internal | External |
|---|---|---|---|---|---|
| 155mb | Teac MT2ST/N50 | Analog | CT600N | $429 | $449 |
| 600mb | Teac MT2ST/F50 | Analog | CT600F | $629 | $649 |
| 2.0GIG | Archive Python | DAT, DDS | 4mm | $1049 | $1069 |
| 3-5GIG | Archive Turbo DAT | DAT, DDS-DC | 4mm | $1339 | $1359 |
| 2.0GIG | WangDAT 1300XL | DAT, DDS | 4mm | $1049 | $1069 |
| 3-5GIG | WangDAT 3200 | DAT, DDS-DC | 4mm | $1339 | $1359 |
| 2-5GIG | Exabyte 8205 NEW! | Helical/Compression | 8mm | $1709 | $1729 |
| 5-10GIG | Exabyte 8505 | Helical/Compression | 8mm | $2649 | $2669 |

Includes RetroSpect v.2.0 Backup Software, One Tape and ONE Year Warranty

# ClubMac OPTICAL Drives

SHARP INTERNAL OPTICAL IS PERFECT FOR THE MAC IIVX, CENTRIS 650 & Q 900/950

| Model | | Capacity | Description | Seek | Internal | External |
|---|---|---|---|---|---|---|
| CMO-OD3000 | Teac | 128mb | 3.5" Half Height | 45ms | $939 | $979 |
| CMO-3100E | Ricoh | 128mb | 3.5" Half Height | 45ms | $1035 | $1075 |
| CMO-JY750 | Sharp | 594/652mb | 5.25" Half Height | 40ms | $2255 | $2295 |
| CMO-5031E | Ricoh | 594/652mb | 5.25" Full Height | 28ms | | $2345 |
| CMO-Tahiti II | MaxOptix | 650mb/1.0GIG | 5.25" Full Height | 35ms | | $3195 |
| 128mb Cartridge | | 3.5" Single Sided | | | | $39 |
| 594/652mb Cartridge | | 5.25"-512/1024 bytes/sec | | | | $95 |

All ClubMac Opticals include ONE cartridge and ONE Year Warranty.

# ACCELERATORS

## DAYSTAR DIGITAL

30 DAY MONEY BACK GUARANTEE

### POWERCACHE

NEW 25 MHZ TURBO 040 ..... $1079
33 MHZ TURBO 040 ..... $1345
NEW FASTCACHE FOR TURBO 040 (25 MHZ) .... $249
FASTCACHE FOR TURBO 040 (33 MHZ) .... $335
CHARGER FOR PHOTOSHOP ..... $789

COMPATIBLE WITH CLASSIC, SE, LC, SE/30, II, IIX, IICX, IISI, IICI, PERFORMA
*POWERCACHE ADAPTER NOT INCLUDED W/O FPU W/ FPU

33 MHZ POWERCACHE* ..... $375 ..... $459
40 MHZ POWERCACHE* ..... $545 ..... $635
50 MHZ POWERCACHE* ..... $715 ..... $845
EQUALIZER LC ..... $169 ..... $239
POWERCACHE ADAPTER ..... $41

### CACHE CARDS

FASTCACHE IISI / IISI WITH FPU ..... $279/349
FASTCACHE IICI ..... $199
FASTCACHE QUADRA - Q700/900 ..... $249
FASTCACHE QUADRA - Q700/900/950 ..... $375

### EXPANSION BOARDS

DUALPORT IISI ..... $165
POWERMATH LC ..... $115

## RADIUS

ROCKET 25i ..... $1049
ROCKET 33 ..... $1949
SCSI-2 BOOSTER ..... $249
ROCKETSHARE ..... $399

## SUPERMAC

THUNDERSTORM ..... $815

CALL FOR MORE SUPERMAC PRODUCTS

# FAX MODEMS

## GLOBAL VILLAGE

### POWERPORT (INTERNAL POWERBOOK FAX/MODEMS)

BRONZE (24/96 S/R FAX MODEM) ..... $179
SILVER (96/96 S/R FAX MODEM) ..... $359
GOLD (14,400 S/R FAX MODEM) ..... $419

### TELEPORT (EXTERNAL DESKTOP FAX/MODEMS)

BRONZE (24/96 S/R FAX MODEM) ..... $189
SILVER (96/96 S/R FAX MODEM) ..... $359
GOLD (14,400 S/R FAX MODEM) ..... $419

## PSI

$50 REBATE FROM PSI

POWERMODEM I ....(24/96/48 S/R FAX MODEM) ..... $129
POWERMODEM II ...(24/96/96 S/R FAX MODEM) ..... $225
POWERMODEM III ..(96/96 S/R FAX MODEM) ..... $275*
POWERMODEM IV ..(14.4/14.4 S/R FAX MODEM) ..... $369*
COMSTATION I ..... $135
COMSTATION V ..... $379*
COMSTATION NETWORK (WITH SW) ..... $CALL*

*LESS MANUFACTURER'S $50.00 REBATE, OFFER ENDS 04/30/93

## PIGEON

14.4 INTERNAL PWRBK FAX MODEM ..... $289

## SUPRA TECHNOLOGY

SUPRAFAXMODEM V.32 WITH SOFTWARE ..... $289
SUPRAFAXMODEM V.32 STANDALONE ..... $239
SUPRAFAXMODEM 14.4 V.32 BIS WITH SW ..... $349
SUPRAFAXMODEM 14.4 V.32 BIS STANDALONE ..... $299

US Robotics
The Intelligent Choice in Data Communications

mac&fax $249

- 14,400 send & receive data & fax modem
- Includes MicroPhone LT & FAX*stf* software

# MISCELLANEOUS

IOMEGA

BERNOULLI TRANSPORTABLE
90MB / 150MB ..... $499 / 785

TRIPACK CARTRIDGES
90MB / 150MB ..... $395 / 385

Bernoulli Transportables incl. one cartridge, cables, software, FIVE Year Warranty.

CLUBMAC PHONENET CONNECTOR ..... $14
CLUBMAC EXTENDED KEYBOARD ..... $79
EXT. HALF HT CABINET WITH CABLES ..... $75
EXT. FULL HT CABINET WITH CABLES ..... $125
EXT. DUO BAY WITH CABLES ..... $125
EXT. 2.5" ENCLOSURE WITH CABLES ..... $99
HARD DRIVE BRACKETS ..... $19
25-50 OR 50-50 SCSI CABLE ..... $10
HDI 30 - 50 PIN CABLE ..... $35
HDI 30 - DB 25 CABLE ..... $30
EXTERNAL TERMINATOR ..... $7.50

# MEMORY

MEMORY PRICES CHANGE FREQUENTLY, CALL FOR CURRENT PRICES

### STANDARD MAC

1MB / 2MB / 4MB X 8 SIMMS ..... $32 / 67 / 129
4MB WITH PAL SIMMS ..... $139
8MB SIMMS / 8MB SIMMS FOR Q700 .. $289/299
16MB SIMMS OR 16MB LOW PROFILE ..... $585

### MAC IIFX

1MB X 8 SIMMS / 4MB X 8 SIMMS ..... $34 / 129
8MB SIMMS / 16MB SIMMS ..... $299 / 599

### CENTRIS 610/650/LCIII

4MB / 8MB / 16MB ..... $149 / 299 / 615
256K VRAM ..... $22

### QUADRA 800

4MB / 8MB / 16MB ..... $179 / 339 / 685

### VIDEO RAM

256K VRAM FOR QUADRAS ..... $22
512K VRAM FOR LC, LCII, IIVX ..... $49

### POWERBOOK 140/145/170

6MB MEMORY MODULE ..... $210

### POWERBOOK 160/180

4MB / 6MB MEMORY MODULE ..... $169 / 245
8MB / 10 MB MEMORY MODULE ..... $325 / 419

### DUO 210/230

4MB / 8 MB MEMORY MODULE ..... $229 / 345

# MONITORS AND VIDEO CARDS

NEC

CASH $100 REBATE

GET A $100 REBATE WHEN YOU BUY THE NEC MACFG 24XP COLOR DISPLAY INTERFACE CARD AND A 15" OR 17" MULTISYNC FG COLOR MONITOR.

### COLOR MONITORS

15" MULTISYNC 3FGx ..... $609
15" MULTISYNC 4FG (ACCUCOLOR) ..... $729
NEW 17" MULTISYNC 5FGe (IN STOCK) ..... $1139
17" MULTISYNC 5FG (ACCUCOLOR) ..... $1299
21" MULTISYNC 6FG (ACCUCOLOR) ..... $2349

### COLOR DISPLAY INTERFACE CARDS

MACFG 24XP ..... $495
MACFG 24X / 8X ..... $1199 / 639

## RADIUS

### MONITORS

COLOR DISPLAY/21 ..... $2319
INTELLICOLOR DISPLAY/20 ..... $CALL
PRECISIONCOLOR PIVOT ..... $935
PRECISIONCOLOR 20 OR 20/S ..... $2319
PRECISIONCOLOR/19 ..... $2029
FULL PG DISPLAY/MONO PIVOT ..... $569/699
2-PG DISPLAY/19 ..... $879
2-PG DISPLAY/21 / 21E ..... $1149 / 1299

### VIDEO CARDS

PRECISIONCOLOR 8XJ ..... $489
PRECISIONCOLOR 24X ..... $1629
PRECISIONCOLOR 24XP / 24XK .... $489 / 819
UNIVERSALCOLOR 24 SM / LG ..... $499 / 839
COLOR PIVOT / MONO PIVOT ..... $499 / 249
2-PG / FULL PG DISPLAY ..... $375/ 189
POWERVIEW ..... $489

## RASTEROPS

### MONITORS

21" COLOR (2168) ..... $2519
20 MULTIMODE COLOR (2085H) ..... $1299
20T MULTISCAN TRINITRON (2075M) ..... $2139
21" MONO/GS (2110) ..... $999
15" MONO/GS PORTRAIT (1510) ..... $499

### VIDEO CARDS

RASTEROPS 24XLI / 24SX ..... $1889 / 619
PAINTBOARD 24 / LI ..... $1449 / 815

## SUPERMAC

### MONITORS

SUPERMATCH 21 TWO-PAGE (9771) ..... $2449
SUPERMATCH 20•T MULTIMODE ..... $2449
SUPERMATCH 20 COLOR (9782) ..... $1479
SUPERMATCH 17•T (9735) ..... $1049
PLATINUM 21 2-PG DISPLAY (9761) ..... $989

### VIDEO CARDS

SPECTRUM/24 SERIES IV ..... $815
SPECTRUM/24 PDQ PLUS ..... $1515
SPECTRUM/8•24 PDQ NUBUS OR IISI ..... $815

# MULTIMEDIA AND CD-ROMS

KODAK'S MULTISESSION PHOTO CD COMPLIANT

NEC

MULTISPIN CDR-74

- 280ms access times
- SCSI-2 compatible
- 256k cache
- MultiSpin Technology
- TWO Year Warranty

NEC MULTISPIN CDR-74 ..... $619
NEC MULTIMEDIA GALLERY ..... $799
NEC CD EXPRESS ... FREE CD OFFER!! .. $349
NEC MULTISPIN CDR-38 ..... $479

## RADIUS

VIDEOVISION (BASIC SYSTEM) ..... $1625
VIDEOVISION (PRESENTATION) ..... $1929
(PRESENTATION PACKAGE INCLUDES ADOBE PREMIERE 2.0)

## RASTEROPS

RASTEROPS 24XLTV ..... $2639
MEDIATIME ..... $1499
VIDEOTIME ..... $1135
MOVIEPAK ..... $1499
RASTEROPS 24STV ..... $729
PHOTOPRO NUBUS ..... $589
VIDEO EXPANDER NTSC ..... $529

## SUPERMAC

VIDEOSPIGOT NUBUS* ..... $369
VIDEOSPIGOT IISI* ..... $329
SPIGOT & SOUND NUBUS* ..... $479
VIDEOSPIGOT PRO NUBUS** ..... $1069
VIDEOSPIGOT IISI** ..... $1229
SPIGOT & SOUND PRO NUBUS** ..... $1069

* FREE ADOBE PREMIERE 2.0 LE ** FREE ADOBE PREMIERE 2.0 FULL VERSION

## TOSHIBA

TOSHIBA CD ROM ..... $719

# NETWORKING

## ASANTE

### MAC SE (68000 PDS)

THK/THN/10BT, 32K ..... $199
THK/10BT, 32K ..... $149

### SCSI PRODUCTS

10BT, INCL SCSI CABLE ..... $239
SCSI CABLE-HPDI30 & DB25 FOR PWRBK .. $45

### FRIENDLYNET ADAPTERS

THN FRIENDLYNET MEDIA ADAPTER ..... $79
THK FRIENDLYNET MEDIA ADAPTER ..... $79
10BT FRIENDLYNET MEDIA ADAPTER ..... $79

### IOBASET HUBS

10BT HUB W/12 10T, THK&THN PORT ..... $479
12-PORT SMART HUB W/SMNP H/W ..... $899

### ETHERTALK TO LOCALTALK

ASANTEPRINT, THK/THN ..... $319
ASANTEPRINT, THK/10BT ..... $319

### MAC II FAMILY, PERFORMA 600 (NUBUS)

THK/THN/10BT, 64K ..... $199
THK/THN, 64K ..... $149
THK/10T, 64K ..... $149

### MAC IISI & SE/30 (030 PDS)

THK/THN/10T, 64K, FPU SOCKET ..... $199
THK/THN, 64K, FPU SOCKET ..... $149
THK/THN, 64K, FPU CHIP ..... $245

### LC, LCII & PERFORMA 400 (020, 030 PDS)

THN/10BT, FPU SOCKET ..... $199
10T, FPU SOCKET ..... $149
10BT, FPU CHIP ..... $245

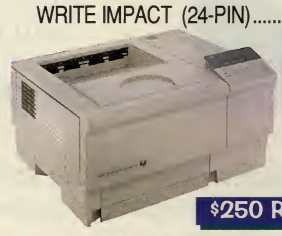
## CLUBMAC

14-PORT 10BT HUB WITH AUI/BNC ..... $395
9-PORT 10BT HUB ..... $195
10BT UNIT (QUADRAS, LASERWRITER IIG) ..... $66
THK/THN/UTP,64K (NUBUS) ..... $129

# PRINTERS

## GCC

PLP II ..... $799
BLP ELITE (4 PPM) ..... $1149
WIDEWRITER 360 ..... $1429
WRITE MOVE II ..... $479
WRITE IMPACT (24-PIN) ..... $499



NEC

NEW LOWER PRICES

$250 REBATE FROM NEC

SILENTWRITER 95F ..... $989 *
SILENTWRITER 97 ..... $1209 *
SILENTWRITER 95FX (BUILT-IN PS FAX) ..... $1249 *
SILENTWRITER 97FX (BUILT-IN PS FAX) ..... $1479 *

* AFTER MANUFACTURER'S $250.00 REBATE, OFFER ENDS 04/30/93

ADOBE PHOTOSHOP INCLUDED

BUY AN AUTO DOC FEEDER & GET UP TO $100 FROM HP

HEWLETT PACKARD
*Authorized Scanner Dealer*

HP SCANJET IIC COLOR SCANNER ..... $1295
- 400 DPI (800 DPI VIA INTERPOLATION) SINGLE PASS SCANNING
- COLORSYNC COMPLIANT • ENHANCED DESKSCAN II SOFTWARE
- BUNDLED WITH ADOBE PHOTOSHOP LIMITED EDITION

HP SCANJET IIP GRAYSCALE SCANNER .$695
- 300 DPI (600 DPI VIA INTERPOLATION) SINGLE PASS SCANNING
- COLORSYNC COMPLIANT • ENHANCED DESKSCAN II SOFTWARE

### HEWLETT PACKARD SCANNER OPTIONS

AUTO DOC FEEDER FOR HP SJ IIC ..... $499
AUTO DOC FEEDER FOR HP SJIIP ..... $279
ScanTastic ps (ADOBE PHOTOSHOP PLUG-IN) .. $69

# SCANNERS

## EPSON

ES-800C COLOR SCANNER ..... $1399
ES-800C (SOFTWARE NOT INCLUDED) ..... $1119
ES-600C COLOR SCANNER ..... $1149
ES-600C (SOFTWARE NOT INCLUDED) ..... $859
AUTOMATIC DOCUMENT FEEDER ..... $465
TRANSPARENCY UNIT ..... $765
ScanTastic ps (ADOBE PHOTOSHOP PLUG-IN) ... $69

## HEWLETT PACKARD

SCANJET IIC COLOR SCANNER ..... $1295
SCANJET IIP GRAYSCALE SCANNER ..... $695
AUTO DOC FEEDER FOR HP SJIIC ..... $479
AUTO DOC FEEDER FOR HP SJIIP ..... $279

## MICROTEK

SCANMAKER II WITH PHOTOSHOP LE ..... $899
SCANMAKER IIXE WITH FULL PHOTOSHOP .... $1179
AUTOMATIC DOCUMENT FEEDER ..... $479

## UMAX

UC-630 WITH PHOTOSHOP ..... $1099
UC-840 WITH PHOTOSHOP ..... $1299
UC-1200S WITH PHOTOSHOP ..... $2999
TRANS/SLIDE SCANNER OPTION ..... $709
AUTOMATIC DOCUMENT FEEDER ..... $489

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## Printers and Printer Accessories

### NEC

**Silentwriter® Model 95fx with PostScript® Fax Option**

**$1249†**

†after $250 mail-in rebate from NEC

- Receive and print conventional faxes or high-quality PostScript faxes on plain paper
- 2MB RAM / 6ppm printing
- Automatically switches interface between Mac & DOS platforms
- 35 Adobe fonts / 14 HP fonts
- PostScript fax option included

**Silentwriter Model 95f** ..... **$1099†**
6 pages per minute; 2MB RAM; 35 Adobe fonts; 14 HP fonts. Automatically switches interface between Mac & DOS

**Fax Upgrade for Model 95f** ..... **$489**

**2MB Memory for Model 95** ..... **$119**

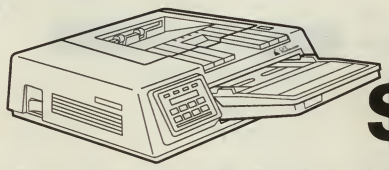
**Toner Cartridge for 95/97** ..... **$165**

**Silentwriter Model 97** ..... **$1499†**
10 pages per minute; 2MB RAM; 35 Adobe fonts; 14 HP fonts. Automatically switches interface between Mac & DOS

**Silentwriter Model 97fx** ..... **$1949†**
Same as Model 97; includes PostScript® Fax option

**†after $250 mail-in rebate from NEC**

### GCC TECHNOLOGIES



**BLP Elite™**

**$969**

The efficient, cost-saving PostScript GCC BLP Elite printer features edge-to-edge printing, straight-through paper path, full 200 sheet paper tray, 4 pages-per-minute printing, 16.67 MHz engine speeds processing, and one year warranty.

**GCC WriteMove® II.** ..... **$499**
For your PowerBook. Only 2.5 pounds, battery-powered, 360x360 dpi laser-quality output, includes ATM™, 21 fonts, background printing, and On-Screen Page Preview.

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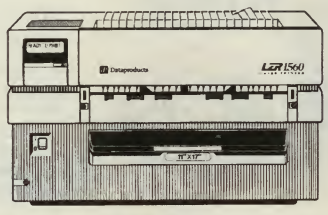
**GCC SelectPress™ 600** ..... **$4149**
True 600x600 dpi, PostScript Level 2 compatible, 35 resident fonts; wide spectrum of paper sizes—A6 to tabloid. Edge-to-edge printing with full bleed capability on 11"x17". Automatically switches between Mac or PC. One year warranty.

**LZR 1560™ Ledger/A3 Laser Printer**

**$2999**

with Two Trays



15 PPM; 300 or true 400 dpi resolution, 4MB RAM; Adobe PostScript Level 2; supports 11"x17" (ledger) size paper; models with one, two or three 250 count input trays

### Dataproducts®

**LZR 960™ Printer.** ..... **$1399**
Unsurpassed performance for Mac users. 300 dpi; 9 ppm printing; 2MB RAM; Adobe PostScript Level 2; 35 resident fonts

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## Monitors and Graphics Cards

### NEC

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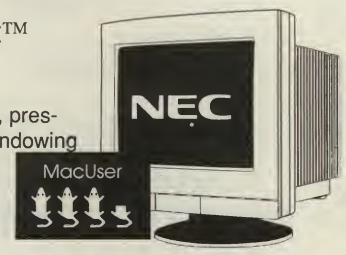
**$599**




Great for general business, presentations, graphics, and windowing applications. 15" diagonal, .28mm dot pitch; 65MHz bandwidth, 1024x768 non-interlaced.

**MultiSync 4FG™** (MacUser ★★★★★) ..... **$719**
15", .28mm dot pitch, 75Mhz, 1024x768 non-interlaced

**MultiSync 5FG** ..... **$1249**
17", .28mm dot pitch, 135MHz, 1024x768 non-interlaced

**MultiSync 6FG** (MacUser ★★★★) ..... **$2299**
21", .28mm dot pitch, 135MHz, 1280x1024 non-interlaced

**$100 Rebate**

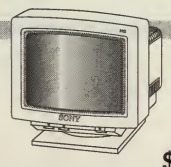
Get a $100 rebate from NEC when you purchase a MacFG 24Xp card with either a 15" or 17" MultiSync FG monitor.
Call for details. Offer ends June 30, 1993.

**NEC MacFG24xp card.** ..... **$549**
24-bit color NuBus card with QuickDraw acceleration

**NEC MacFG8x card.** ..... **$639**
8-bit color NuBus card with QuickDraw™ acceleration

**NEC MacFG24x card.** ..... **$1199**
24-bit color NuBus card with QuickDraw acceleration

### SONY®



**Sony CPD-1304S** 14" Trinitron®. ..... **$569**

**Sony CPD-1604S** 17" Trinitron Multiscan®. ..... **$1049**

### SUPERMAC™

**SuperMac Spectrum/8•24 PDQ™ si** ..... **$369**
Fast & versatile graphics card for fast 8-bit color on large displays; 16-bit color on 15", 16", and 17" displays and accelerated 24-bit color on small displays.

**SuperMac Graphics Cards**

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Spectrum/24™ Series IV ..... $799
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SuperMac ThunderStorm™ ..... $799
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**SuperMatch™ 17" Multimode Color** ... **$949**
Mac & PC compatible, works w/ Quadra motherboard graphics.

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Use directly with Quadra on-board video.

**SuperMac DigitalFilm™** ..... **call**
Includes DigitalFilm Player, DigitalFilm Recorder, and DigitalFilm Encoder, Breakout Box , and Adobe Premiere™ 2.0.

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**1-year on-site warranty on all Radius Products!** NEW!

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**Radius Color Display/21™** ..... **$2199**
21-inch color display for Macintosh (NuBus™) computers. Displays two facing pages in a resolution of 1152x870 at 75 Hz and 78 dpi. Also supports 1072x810 for WYSIWYG (72 dpi) display.

**Radius Monochrome Two Page Display/19.** ..... **$849**
19-inch, landscape, Two Page display display for Mac and PC computers. Mac resolution is 1152x 882 at 71Hz at 82 dpi.

**Radius Monochrome Two Page Display/21.** ..... **$1149**

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UniversalColor 24XP Card ..... $499
UniversalColor 24XK Card ..... $799
PrecisionColor 8XJ Card ..... $489
PrecisionColor 24X Card ..... $1629
PrecisionColor 24XP Card ..... $489
Radius Rocket 25i™ ..... $969
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**New!** **Suntouch Mac Extended Keyboard ....$89**
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SONY®

**128MB Magneto Optical Disk Drive**
**RMO-S350** 3.5" with Mac kit .....$1489

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**RMO-S550** 5.25" with Mac kit .....$2429

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### NEC CD-ROM Drives

**CDR-25 Express™ Bundle.** .....$399
CDR-25 with 1 pair amplified stereo speakers, stereo headphones, and 10 new CD titles.

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CDR-74 with CD Gallery includes 1 pair amplified stereo speakers, headphones, and 6 CD titles.

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- NEC P200/300Portable Cellular phone
- Stylish Leather Attaché

**PowerBook not included**

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with any purchase

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PhoneNET StarController EN™ .....$1025
PhoneNET StarController 24 Port .....$1199
Ether10-T Starlet™ .....$259
PowerPath .....$69

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**PhoneNET PC** .....$129
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AppleTalk software router for LocalTalk and EtherTalk, and TokenTalk.
**Timbuktu/Windows** .....$129
Timbuktu is the easiest way to create a peer-to-peer network. Share peripherals & exchange files quickly & easily.
**Complete line of Farallon products available**

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Supra Corporation®

**SupraFAXModem™ 144PB.** .....$299
For PowerBook models 100 through 180. 14,400 bps data and fax transmission.

**Supra FAXModem V.32bis.** .....$349
14,400 bps data and send/receive fax transmission. Includes FAXstf™, Microphone™ 1.6 software and cable.

**Supra FAXModem+.** .....$179

### Global Village Modems

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14,000 bps data ; 9600 bps fax send/receive

**PowerPort/Silver™.** .....$359
9600 bps data ; 9600 bps fax send/receive

**PowerPort/Bronze™** .....$179
2400 bps data; 9600 bps fax send; 4800 bps fax receive

GLOBAL VILLAGE™

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**PowerLink™ Presentor.** .....$429
Connects Power-Book Duo to large screen displays, televisions, LCDs and projectors.

**E-Machines PowerLink DeskNet™** .....$689
The only desktop dock with full-speed Ethernet. Choose 10BaseT or Thin Ethernet.

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**1MB SIMMs** .....$37
**2MB SIMMs** .....$69
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**4MB SIMMs** for LC III, Centris .....$149
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### PowerBook Memory Modules

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**8MB** for PowerBook Duo 210/230 .....$419
**10MB** for PowerBook 160/180 .....$509

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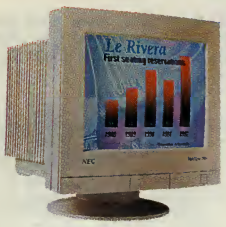

## NEC MultiSync® Monitors

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### 3FGx™ 15" Monitor — $609

- 1024 X 768 **Non-interlaced** @ 60 Hz
- .28mm Trio dot pitch
- 65 MHz max. video bandwidth

*D1-NEC3FGX* SRP $799
MAC CABLE PART # *F1-MACADP*

### 4FGx™ 15" Monitor — $709

MacUser ★★★★★ Editors' Choice

- 1024 X 768 **Non-interlaced** @ 70 Hz
- .28mm Trio dot pitch
- 75 MHz max. video bandwidth

*D1-NEC4FG* SRP $949
MAC CABLE PART # *F1-MACADP*

PC Magazine Editors' Choice — NEC MULTISYNC 4FG MARCH 1993
World Class Best of '92

4FG + MacFG™ 8X display interface card $1339
4FG + MacFG™ 24X display interface card $1899

### 5FG™ 17" Monitor — $1249

- 1280 x 1024 **Non-interlaced** @ 74 Hz
- .28mm Trio dot pitch
- 135 MHz max. video bandwidth

*D1-NEC5FG* SRP $1599
MAC CABLE PART # *8325FG*
5FG + MacFG™ 24X display interface card $2439

### 6FG™ 21" Monitor — $2299

- 1280 x 1024 **Non-interlaced** @ 74 Hz
- .28mm Trio dot pitch
- 135 MHz max. video bandwidth

*D1-NEC6FG* SRP $2899
MAC CABLE PART # *8325FG*
6FG + MacFG™ 24X display interface card $3479

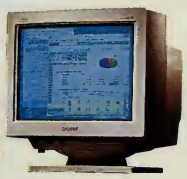
## SONY

### CPD-1304 14" Multiscan® Trinitron® Color Monitor — $569

- 1024 x 768 **Non-interlaced**
- .25mm Trio dot pitch
- 50MHz bandwidth (typical)

*D1-S1304*

### CPD-1604S 17" Multiscan® Trinitron® Color Monitor — $1049



- 1024 x 768 **Non-interlaced**
- .25mm Trio dot pitch
- 60MHz bandwidth (typical)

*D1-S1604* SRP $1700
MAC ADAPTER *TMACSTD* $16.95

## NEC MacFG™ 8X/24X Color Display Interface Card

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**Color Scanners**

- 24-bit "TruePass" scanning capable of producing over 16.6 MILLION colors!
- ES-600C - SCSI I/F, 300 DPI
- ES-800C - SCSI & BIDI I/F, 400 DPI
- Optional Automatic Document Feeder and Transparency Unit

**MAC Interface Kit:** CALL
- Adobe® Photoshop® 2.0
- PIM and DA Cable
- Epson's Apple scanner driver

**Interface kit is required** (Sold separately)

*Than the Epson ES-300C

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- HP LaserJet Series II emulation
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POSTSCRIPT

**$799** NEW LOW PRICE — *B1-EPL7500*

## $250 Mail-In Rebate from NEC!

MacUser Magazine ★★★★½

POSTSCRIPT

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**Model 95f Rebate**

| | |
|---|---|
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| YOUR COST AFTER REBATE | $1099 |

- 6 PPM PostScript® Level 2 and PCL 5
- AppleTalk/Parallel/Serial
- Automatic Emulation Switching • 2 MB exp. to 5 MB
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### Silentwriter 95fx

Same as above with built-in plain paper send/receive fax capability *B1-NEC95FX*

**Model 95fx Rebate**

| | |
|---|---|
| FLEX PRICE | $1649 |
| NEC MAIL-IN REBATE | - $250 |
| YOUR COST AFTER REBATE | $1399 |

Rebate offer ends April 30, 1993

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MacUser Magazine ★★★★ March 1993

- Fast 450ms access time
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- 64 KB cache memory
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*D1-CDR-37 & CD-MA002*

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MacUser Magazine ★★★½ March 1993

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PC Magazine Editors' Choice — November 26, 1991 IBM LaserPrinter 10

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- 300 dpi with PQET, Max. 600 dpi w/optional memory
- 10 MHz • 3MB • Up to 6 ppm
- AppleTalk®, Rasterport interface
- 39 Adobe® Type 1 scalable fonts
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POSTSCRIPT

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- Up to 10 ppm

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POSTSCRIPT

Printers require MAC cable. Call for price.

**Optional Accessories Available - CALL**

## Dataproducts

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MacUser Magazine ★★★★½

- RISC-based Processor
- 300 dpi • 2MB • 9 PPM
- 35 resident typefaces
- LocalTalk/RS-422, Centronics parallel, RS-232-C serial & SCSI interface — $1399

*B1-LZR960-001*

### LZR 1560 Ledger/A3 Laser Printer — $2999

MacUser Magazine ★★★½ March 1993

- 11 x 17" Imaging • Max. 400 dpi res.
- PostScript® Level 2 from Adobe® • 4MB
- 35 resident typefaces • Max 15 PPM

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**Code # MW0419**

# GET THE ROYAL TREATMENT WITH KING MEMORY AND PERIPHERALS.

## King Memory offers the guaranteed lowest prices you'll find anywhere in this issue of MacWEEK*

### POWERBOOK MEMORY

| | |
|---|---|
| New! | 4MB MODULE P/B 165-C |
| New! | 6MB MODULE P/B 165-C |
| New! | 8MB MODULE P/B 165-C |
| New! | 10MB MODULE P/B 165-C |
| | 4MB MODULE P/B 160/180 |
| | 6MB MODULE P/B 160/180 |
| | 8MB MODULE P/B 160/180 |
| | 10MB MODULE P/B 160/180 |
| | 2MB MODULE P/B 140; 145; 170 |
| | 4MB MODULE P/B 140; 145; 170 |
| | 6MB MODULE P/B 140; 145; 170 |
| | 2MB MODULE POWERBOOK 100 |
| | 4MB MODULE POWERBOOK 100 |
| | 6MB MODULE POWERBOOK 100 |

### DUO MEMORY

| | |
|---|---|
| | DUO DOCK 210/230 4MB MODULE |
| | DUO DOCK 210/230 8MB MODULE |
| New! | DUO DOCK 210/230 14MB MODULE |

### CENTRIS /LCIII

| | |
|---|---|
| New! | 1MB MODULE LCIII |
| New! | 2MB MODULE LCIII |
| New! | 4MB MODULE CENTRIS, LCIII |
| New! | 8MB MODULE CENTRIS, LCIII |
| New! | 16MB MODULE CENTRIS, LCIII |
| New! | 32MB MODULE CENTRIS, LCIII |

### Standard SIMMs

1MBX8-70
1MBX8-80
2MBX8-80
2MBX8-70
4MBX8-80
4MBX8-70
4MB with PAL
8MB Standard
8MB Q700
16MB Standard
16MB Q-700

### QUADRA 800

| | |
|---|---|
| New! | 4MB Q-800 |
| New! | 8MB Q-800 |
| New! | 16MB Q-800 |
| New! | 32MB Q-800 |

### VX

| | |
|---|---|
| New! | 32MB VX Kit |
| New! | 64MB VX Kit |

### FX

1MB IIfx-70
4MB IIfx-70
8MB IIfx-70
16MB IIfx-70

### PORTABLE/BACKLIT

1MB Portable/Backlit
through
7MB Portable/Backlit

### ACCELERATOR SIMMs

16MB Credit Card

### VRAM

LC
Centris
Duo
Quadra

### G-WORLD SIMMs

1MB 8*24 6C
4MB 8*24 6C
1MB Thunder Card Simm
4MB Thunder Card Simm

*Many other Apple memory upgrades available - please call!*

- *Featuring the new UPS 3 Day Select™ service.*
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- *All products carry a lifetime warranty.*
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24-Hour FAX Number: (714) 572·5363
Call Monday-Friday 6AM - 6PM PDST • Sat 9AM - 1PM PDST
5761 E. La Palma Ave • Suite 182 • Anaheim CA 92807

**NEW!**
*- Syquest 105mb drives - now in stock!*

All Syquest cartridges are bundled with DIVA VideoShop
*– a $599 value –*
**FREE!**
until 4/30/93

All CD-ROMs are bundled with Kodak Photo-CD Access Software
*– a $99 value –*
**FREE!**

### SyQuest

| Model | |
|---|---|
| External SyQuest 44mb (One Cartridge Inc.) | $385 |
| External SyQuest 88mb (One Cartridge Inc.) | $485 |
| External SyQuest 88mb C* (One Cartridge Inc.) | $585 |
| External SyQuest 105mb (One Cartridge Inc.) | $785 |
| Internal 44mb SyQuest (for Quadra 900&950) | $345 |
| Internal 88mb SyQuest (for Quadra 900&950) | $465 |
| Internal 88mb C SyQuest (for Quadra 900&950) | $555 |
| External SyQuest Dual 44mb (One Cartridge Inc.) | $725 |
| External SyQuest Dual 88mb (One Cartridge Inc.) | $895 |
| External SyQuest Dual 44/88mb (One 44 & One 88 Cartridge) | $895 |
| External SyQuest Dual 88C mb(One Cartridge Inc.) | $1075 |
| External SyQuest Dual 44/88C mb(One 44 & One 88 Cartridge) | $995 |
| SyQuest 44mb Cartridge/10 Pack | $63/$620 |
| SyQuest 88mb Cartridge/5 Pack | $97/$480 |
| SyQuest 105mb Cartridge | $75 |

**All SyQuest Drives come with FWB™ HDT Formatting Software. SyQuest carries a TWO year Warranty on Drives and ONE year on Cartridges. *READS AND WRITES 44 AND 88 CARTRIDGES. Does not format 44 cartridges.**

### Quantum

**"An Apple Authorized Brand"**

| Formatted Capacity | Speed | Size | Internal | External |
|---|---|---|---|---|
| ELS 42mb | 19ms | 3.5"TH | $175 | $235 |
| ELS 85mb | 17ms | 3.5"TH | $199 | $259 |
| ELS 127mb | 17ms | 3.5"TH | $255 | $315 |
| ELS 170mb | 17ms | 3.5"TH | $279 | $339 |
| LPS 105mb | 10ms | 3.5"TH | $235 | $295 |
| LPS 240mb | 10ms | 3.5"TH | $369 | $429 |
| LPS 525mb | 10ms | 3.5"TH | $889 | $949 |
| Pro 700mb | 10ms | 3.5"HH | $1189 | $1249 |
| Pro 1.05gb | 10ms | 3.5"HH | $1329 | $1389 |
| Pro 1.22gb | 10ms | 3.5"HH | $1479 | $1539 |
| *GO•80mb | 16ms | 2.5"PB | $299 | $399 |
| *GO•120mb | 16ms | 2.5"PB | $389 | $489 |
| *GO•160mb | 16ms | 2.5"PB | $499 | $599 |

**TWO year Warranty. *ONE year Warranty on GO drives. FWB™ HDT Formatting Software Included.**

### TOSHIBA

| Formatted Capacity | Speed | Size | Internal | External |
|---|---|---|---|---|
| 877mb | 12.5ms | 3.5"HH | $1039 | $1099 |
| 1.23gb | 12.5ms | 3.5"HH | $1339 | $1399 |
| 213mb NEW! | 12ms | 2.5"PB | $549 | $649 |
| CD-ROM | | | | |
| 600mb NEW! | 200ms | 3.5"HH | $539 | $599 |

**Kodak Photo-CD/Multisession compatible**

**Toshiba carries a THREE year Warranty on drives. ONE year Warranty on CD Rom. FWB CD Rom Tool Kit Formatting Software Included.**

## MAGNETO-OPTICAL

### TEAC

| Model | Speed | Size | External |
|---|---|---|---|
| 128mb | 45ms | 3.5"HH | $979 |
| 128mb cartridges (Tosoh) | | | $39 |

### RICOH

| Model | Speed | Size | External |
|---|---|---|---|
| 128mb | 45ms | 3.5"HH | $1075 |
| 650mb | 28ms | 5.25"FH | $2345 |
| 128mb/650mb Cartridge | | | $39/99 |

### Maxtor®

| Model | Speed | Size | External |
|---|---|---|---|
| Tahiti IIM | 35ms | 1.0gb | $3175 |
| 1.0gb Optical Glass Cartridge | | | $225 |

**All MO drives come with FWB HDT software, ONE MO cartridge and have a ONE year Warranty.**

## TAPE BACK-UP

### ARDAT

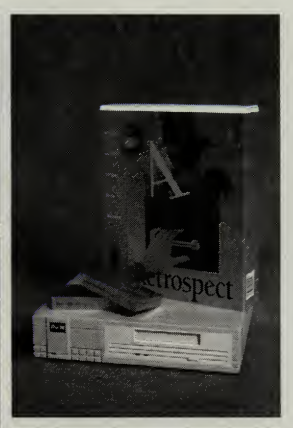
| Model | External |
|---|---|
| Viper 250 | $499 |
| Viper 500 | $699 |
| 2.0gb Standard | $1099 |
| 4.0gb - 8.0gb Compression Turbo | $1499 |
| 90m /60m Tape | $19/$16 |

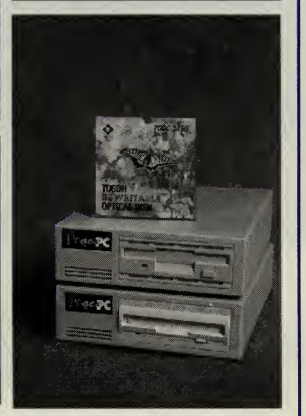
### TEAC

| Model | External |
|---|---|
| 150mb Tape Backup Drive | $469 |
| 600mb Tape Backup Drive | $669 |
| 600mb / 150mb Tape Cassette | $25/$20 |

**All tape backup drives come bundled with FREE Retrospect V.2.0, one tape and have a ONE year warranty.**

*FWB HDT Formatting Software is included with all the items you see on this page.*



## HARD DRIVES

### MICROPOLIS

**"Novell Certified"**

| Formatted Capacity | Speed | Size | Internal | External |
|---|---|---|---|---|
| 698mb | 10ms | 3.5"HH | $1239 | $1299 |
| 1.05gb | 10ms | 3.5"HH | $1339 | $1399 |
| 2.1gb | 12ms | 5.25"FH | $2695 | $2795 |

**Fast SCSI-2 Drives. FIVE year Warranty. FWB™ HDT Formatting Software Included.**

### CONNER

**"An Apple Authorized Brand"**

| Formatted Capacity | Speed | Size | Internal | External |
|---|---|---|---|---|
| 82mb | 17ms | 3.5"TH | $195 | $255 |
| 160mb | 13ms | 3.5"TH | $275 | $335 |
| 206mb | 12ms | 3.5"TH | $365 | $425 |
| 515mb NEW! | 10ms | 3.5"HH | $889 | $949 |

**TWO year Warranty. FWB™ HDT Formatting Software Included.**

### FUJITSU

| Formatted Capacity | Speed | Size | Internal | External |
|---|---|---|---|---|
| 513mb SPECIAL! | 9ms | 3.5"HH | $889 | $949 |
| 672mb SPECIAL! | 16ms | 5.25"FH | $999 | $1099 |
| 1.0gb NEW! | 9ms | 3.5"HH | $1549 | $1609 |
| 1.03gb | 15ms | 5.25"FH | $1289 | $1389 |
| 1.65gb | 15ms | 5.25"FH | $2249 | $2349 |
| 2.05gb | 12ms | 5.25"FH | $2449 | $2549 |

**FIVE year Warranty. FWB™ HDT Formatting Software Included.**

### Maxtor®

| Formatted Capacity | Speed | Size | Internal | External |
|---|---|---|---|---|
| 120mb | 15ms | 3.5"TH | $225 | $285 |
| 203mb | 15ms | 3.5"TH | $329 | $389 |
| 325mb | 15ms | 3.5"HH | $579 | $639 |
| 520mb NEW! | 9ms | 3.5"HH | $939 | $999 |
| 1.15gb NEW! | 9ms | 3.5"HH | $1499 | $1559 |
| 1.0gb | 13ms | 5.25"FH | $1295 | $1395 |
| 1.43gb | 13ms | 5.25"FH | $1595 | $1695 |

**TWO year Warranty on 3.5" Drives and FIVE Years on 5.25" Drives. FWB™ HDT Formatting Software Included.**

### Seagate

| Formatted Capacity | Speed | Size | Internal | External |
|---|---|---|---|---|
| 1.0gb | 11ms | 3.5"HH | $1329 | $1389 |
| 1.0gb | 15ms | 5.25"FH | $1199 | $1299 |
| 1.35gb | 15ms | 5.25"FH | $1649 | $1749 |
| 1.9gb | 13ms | 5.25"FH | $1849 | $1949 |
| 1.3gb | 11ms | 5.25"FH | $1799 | $1899 |
| 2.05gb | 11ms | 5.25"FH | $2499 | $2599 |
| 2.75gb | 11ms | 5.25"FH | $3399 | $3499 |

**ONE year Warranty. FWB™ HDT Formatting Software Included.**

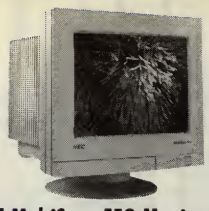
## STORAGE SUPER SPECIAL

| | Internal Kit | | Price |
|---|---|---|---|
| Maxtor | 120mb | 3.5"HH | $225 |
| Conner | 170mb | 3.5"HH | $275 |
| Toshiba | 213mb | 2.5"PB | $549 |
| Quantum | 240mb | 3.5"TH | $369 |
| Fujitsu | 520mb | 3.5"HH | $889 |
| Quantum | 525mb | 3.5"HH | $889 |
| Fujitsu | 778mb | 5.25"FH | $999 |
| Micropolis | 1.05gb | 3.5"HH | $1339 |

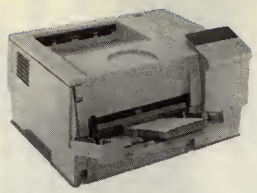
*Mac&PC believes in first-class quality and customer service. As part of our commitment, we offer the following:*
- *All of our storage drives are pre-tested before shipment, to assure that your product will be in working order.*
- *Should your product not be perfect, we offer toll-free tech support at 800-392-5818.*
- *There is no surcharge on* any *credit card purchase.*

# NEC

| | |
|---|---|
| MultiSync 3FGx – 15" Monitor | $615* |
| MultiSync 4FG – 15" Monitor | $735* |
| MultiSync 5FG – 17" Monitor | $1305* |
| MultiSync 6FG – 21" Monitor | $2355 |
| FG8x 8-bit board | $645 |
| FG24x 24-bit board | $1205 |
| FG24xp 24-bit board | $505 |
| CD-Express | $355 |
| CD-ROM CDR-74 | $625 |
| Multi-Media Gallery | $805 |
| SilentWriter 95F Printer | $1125** |
| SilentWriter 95FX Printer | $1475** |
| SilentWriter 97F Printer | $1505** |
| SilentWriter 97FX Printer | $1815** |
| ColorMate PS-40 Color Printer | $4399** |



**NEC MultiSync 5FG Monitor**
- 17" Multi-Frequency Color Monitor
- AccuColor Control System
- Up to 1024x768 resolution



**NEC SilentWriter Model 95f Laser Printer**
- PostScript Level 2
- Envelope feeder and cassette included

MacUser August 1992

**$1205***

*After $100.00 Mail-In Rebate with purchase of 24xp Color Display Interface Card and 15" or 17" FG Color Monitor.

MacUser September 1992

**$1125***

*After $250.00 Mail-In Rebate

*– Offer ends 4/30/93 –*

## VIDEO

### RasterOps

| | |
|---|---|
| 21" Mono/Gray-Scale Monitor | $999 |
| 21" Color Hitachi | $2569 |
| 20" Color Trinitron MultiScan RO **NEW!** | $2349 |
| 20" Color Hitachi MulitScan | $1339 |
| 24 STV Interface | $769 |
| 24 SX Interface | $619 |
| 24 XLI Interface | $1929 |
| Paintboard 24 | $1549 |
| Paintboard LI | $829 |
| CorrectPrint 3001 | $6999 |

### radius

| | |
|---|---|
| PrecisionColor Display/20 or 20s | $2399 |
| PrecisionColor 19 | $2099 |
| PrecisionColor Pivot | $969 |
| PrecisionColor 24XK Interface | $839 |
| PrecisionColor 24XP Interface | $499 |
| PrecisionColor 8XJ Interface | $499 |
| VideoVision (Basic) | $1679 |
| VideoVision (Presentation) | $1999 |
| Rockets 25i | $999 |
| Rockets 33 | $1999 |
| RocketShare | $419 |
| SCSI-2 Booster | $249 |

### SUPERMAC

| | |
|---|---|
| SuperMatch 21" Color Monitor | $2499 |
| SuperMatch 17" Color Monitor/Multimode | $1179 |
| Two-Page 21" Platinum Monitor | $999 |
| SuperMatch 17T Color Trinitron Monitor | $1089 |
| Thunderstorm | $839 |
| Spectrum 24 PDQ Plus | $1549 |
| Thunder/8 | $1169 |
| Spectrum/8 • 24 PDQ | $839 |
| Spectrum 24/Series IV **NEW!** | $839 |
| VideoSpigot Nubus | $379 |
| Spigot and Sound Pro w/Adobe Premiere v2.0 | $1169 |
| Digital Film w/Adobe Premiere v2.0 | $4799 |

### SONY

| | |
|---|---|
| 1430 - 14" Color Trinitron | $669 |
| 1320LC - 14" Color Trinitron for LC | $429 |
| 1604S - 16" Color Trinitron | $1089 |

**Includes MAC Adaptor. Quadra compatible.**

### SIGMA DESIGNS

| | |
|---|---|
| Power Portrait 15" w/anti-glare | $619 |
| ColorMax 15" | $739 |
| ColorMax 20H - 20" Hitachi | $1639 |
| ColorMax 20T - 20" Trinitron | $2049 |

## DIGITIZING TABLETS

### Wacom

| | |
|---|---|
| 6x8 Artz **NEW!** | $309 |
| 6x9 Standard Tablet | $462 |
| 12x12 Standard Tablet | $660 |
| 12x12 ElectroStatic Tablet | $726 |
| 12x18 Standard Tablet | $990 |
| 12x18 ElectroStatic Tablet | $1058 |

## Macintosh Inventory Blowout!

- IIvx 4/80 ..... $1529
- IIvx 4/230 ..... $1779
- IIvx 5/80 with CD ..... $1949

**All Macs are brand new and have a ONE year warranty. Prices good while supplies last.**

## MAC SYSTEMS

| | |
|---|---|
| Powerbook 165 Color | $3199 |
| Classic Color 4/80 **NEW!** | $1339 |
| LC III 4/80 – 4/160 **NEW!** | $1289/$1439 |
| IIVX 4/80 – 4/230 – 5/80 w/CD-Rom | $1529/$1779/$1949 |
| Centris 610 4/80 w/o Ethernet **NEW!** | $1679 |
| Centris 650 4/80 w/o Ethernet **NEW!** | $2449 |
| Centris 650 8/80 with Ethernet | $2899 |
| Quadra 950 8/0 | $4699 |
| Quadra 800 8/230 | $3999 |
| Apple Adjustable Keyboard **NEW!** | $215 |
| Apple 14"/16" Color Monitor | $529/$1279 |
| StyleWriter II **NEW!** | $349 |
| Apple LaserWriter Pro 600/630 | $1999/$2419 |
| Apple Color Printer **NEW!** | $2249 |

**We carry the complete line of Mac Systems. Call for current pricing.**

## POWERBOOK / DUO ACCESSORIES

**All the neccessities to complement your Powerbook or Duo.**

**Powerbooks:**

| | |
|---|---|
| PowerBook Cables (HDI 30-25 or 50) | $35 |
| Radius PowerView for Powerbooks | $499 |
| External Battery Recharger for PowerBook | $149 |
| PowerBook Battery | $79 |
| PowerPad-Sophisticated Circuits | $79 |
| Auto Power Adapter/Empire Engineering | $89 |
| GCC WriteMove II Printer | $499 |
| AE AxCell (Cellular Phone Interface) | $270 |
| AE DataLink PB | $473 |
| AE Powerbook Auto Adapter | $66 |
| E-Mach PowerLink Presenter | $479 |

**Duos:**

| | |
|---|---|
| Duo Floppy Adapter | $135 |
| HDI-20 Ext. 1.44mb Floppy Drive | $199 |
| Duo A/C Adapter | $69 |
| Duo Rechargable Battery | $69 |
| Duo Dock | $975 |
| Apple Mouse II | $79 |

**Carrying Cases:**

| | |
|---|---|
| I/O Design Ultimate SL/EX - nylon | $69/$79 |

**For memory see Macintosh SIMMS section below, and for 2.5" drives see Quantum and Toshiba section on first page.**

## MACINTOSH SIMMS

| | |
|---|---|
| 1x8/2x8/4x8/16x8 @ 80ns | $31/$61/$125/$525 |
| **Quadra 700/950** | |
| 4x8/16x8 | $125/$525 |
| **Powerbook 140/170** | |
| 4mb/6mb/8mb | $179/$255/$355 |
| **Powerbook 160/180** | |
| 4mb/6mb/8mb/10mb | $225/$295/$395/$445 |
| **Duo 210/230** | |
| 4mb/8mb | $299/$499 |
| **PC** 1x9/4x9 | $39/$139 |
| ***NEW 32-BIT SIMMS*** | |
| 4x8/8x8/16x8 @ 70ns | $134/$269/$599 |

## PRINTERS

### GCC TECHNOLOGIES

| | |
|---|---|
| WriteImpact 24-Pin | $499 |
| PLPII 1mb/4ppm/300dpi | $799 |
| PLPIIS 1mb/8ppm/300dpi | $1099 |
| BLPII 2mb/4ppm/300dpi | $1499 |
| BLPIIS 2mb/8ppm/300dpi | $1749 |
| BLPIIS 4mb/8ppm/300dpi | $2179 |
| BLP Elite 2mb/4ppm/300dpi | $1149 |
| BLP Elite 2mb/8ppm/300dpi | $1399 |
| WideWriter 360 512k/360dpi | $1399 |
| SelectPress 600 8mb/8ppm/600dpi | $3999 |

### UMAX

| | |
|---|---|
| UC - 1200s with Adobe PhotoShop™ v2.0.1 FV | $2999 |
| UC - 840 with Adobe PhotoShop™ v2.0.1 FV | $1299 |
| UC - 630 with Adobe PhotoShop™ v2.0.1 FV | $1099 |
| UC - 630 with Typereader OCR | $899 |
| Automatic Document Feeder | $489 |
| Transparency / Slide Scanner Option | $709 |

**Call for pricing on other models.**

### TEXAS INSTRUMENTS

| | |
|---|---|
| Microlaser Plus PS-17 with Appletalk | $1169 |
| Microlaser Plus PS-35 with Appletalk | $1299 |
| Microlaser Turbo with Appletalk | $1459 |
| AppleTalk Kit | $49 |
| 1mb upgrade for PS-17/PS-35/Turbo | $49 |
| Toner Cartridge | $49 |

### HEWLETT PACKARD

| | |
|---|---|
| Deskwriter | $409 |
| Deskwriter 550-C | $769 |
| LaserJet 4M | $1999 |

## MODEMS

### US Robotics

| | |
|---|---|
| Mac&Fax SPORTSTER Modem 14.4bps, Send/Receive FAX Modem **SUPER SPECIAL!** | $249 |
| WorldPort FAX | $459 |

### TWINCOM

| | |
|---|---|
| 24/96 PowerTwin – Internal for Powerbooks | $131 |
| 24/96 Commuter – External | $136 |
| 24/96 FaxNet – External | $318 |
| 14.4 Pro– External | $340 |
| 14.4 MacVoyager – Pocket External | $374 |
| 14.4 FaxNet – External | $522 |
| 14.4 PowerTwin – Internal for Powerbooks | $568 |

**TWO year warranty.**

## NETWORK

### ASANTÉ

| | |
|---|---|
| MC3NB - Thick/Thin/10 Base T, 64k | $209 |
| MC+IIE64 - Thick/Thin, 64k | $159 |
| MC+IIET64 - Thick/10 Base T, 64k | $159 |
| MC+LCII - Thin/10 Base T, FPU Socket | $209 |

**We carry the full line of Asante Products.**

## ACCELERATORS

### DAYSTAR DIGITAL

| | |
|---|---|
| Charger **NEW!** | $809 |
| DualPort IIsi | $169 |
| Turbo 040 25 MHz | $1099 |
| Turbo 040 33 MHz | $1349 |
| Fastcache Turbo 25-128k cache | $259 |
| Fastcache Turbo 33-128k cache | $335 |
| FastCache Quadra (700, 900 & 950) - 128K | $379 |
| PowerCache 33MHz OR w/ FPU | $375/$465 |
| PowerCache 40MHz OR w/ FPU | $545/$635 |
| PowerCache 50MHz OR w/ FPU | $715/$845 |
| PowerCache Adapters* | $42 |

*** Additional on all PowerCache cards except for IIci**

### APPLIED ENGINEERING

| | |
|---|---|
| Plus Drive | $299 |
| 3.5 Mac Drive (External 1.44) | $225 |
| QuadraLink (4 Port Serial for Mac IIs) | $198 |
| TransWarp LC – 25MHz or w/FPU | $360/415 |
| TransWarp LC – 33MHz or w/FPU | $405/507 |
| TransWarp LC – 40MHz or w/FPU | $369/505 |
| TransWarp SE – 25MHz or 40MHz or 40MHz w/FPU | $185/249/390 |
| TransWarp Classic – 25MHz or 40MHz or 40MHz w/FPU | $185/249/390 |

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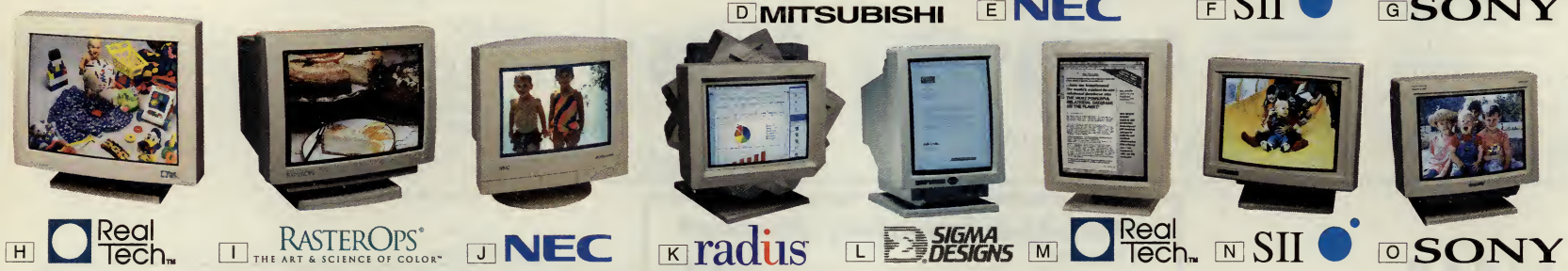
# HARDWARE THAT FITS




*My experience in running large retail organizations for more than 16 years was the person at the top normally heard from customers only when things 'had not gone according to Hoyle' somewhere down the line. I would like to be the exception and bring to your attention my experiences of outstanding service from two of your employees during my recent purchase of a RealTech 19" monitor and RasterOps 24XLi card...their responsive service was a refreshing change.*

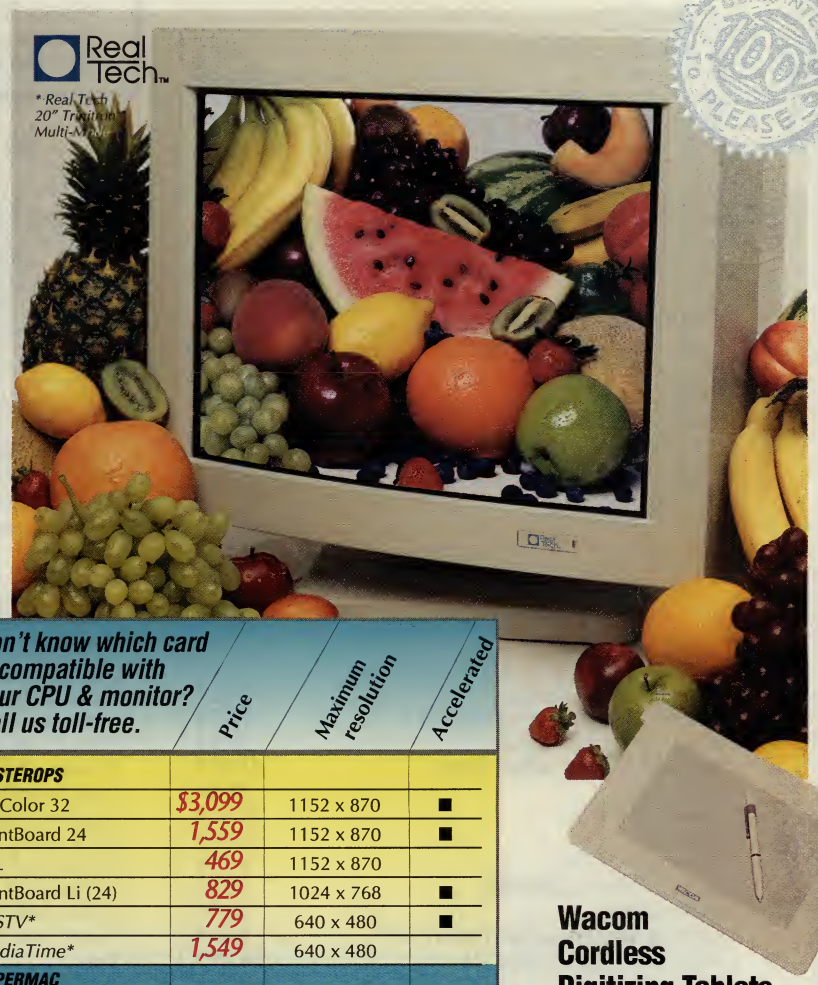
*— Stephen E. Snider*

* E-Machines 16" Color (ColorPage T16)

E-MACHINES

SUPERMAC

* SuperMatch 20•T Multi-Mode XL




* Real Tech 20" Trinitron Multi-Mode

## Monitors: all sizes, brands & prices

| Need help choosing a monitor? Not sure if you need one that auto-syncs? Call our friendly sales team. They're happy to answer your questions. | Price | Tube type | 640 x 480 | 640 x 870 | 832 x 624 | 1024 x 768 | 1152 x 870 | Auto-syncing | Anti-glare |
|---|---|---|---|---|---|---|---|---|---|
| A. Radius 21" Color | $3,069 | Hitachi | | | | | ■ | | ■ |
| *NEC 21" 6FG Color* | 2,429 | NEC | ■ | | ■ | ■ | ■ | ■ | |
| *SuperMac 21" Mono/Grayscale* | 989 | — | | | | | ■ | | ■ |
| B. SuperMac 20" (SuperMatch) | $1,499 | Hitachi | | | | ■ | | | ■ |
| C. *NEW!* RasterOps 20" Trinitron Multi-Mode | 2,359 | Trinitron | ■ | | ■ | ■ | ■ | ■ | ■ |
| * RealTech 20" Trinitron Multi-Mode | 1,895 | Trinitron | ■ | | ■ | ■ | ■ | ■ | ■ |
| *NEW! Radius IntelliColor 20"* | 2,759 | Trinitron | ■ | | ■ | ■ | ■ | ■ | ■ |
| *RasterOps 20" Hitachi Color* | 1,199 | Hitachi | ■ | | ■ | ■ | ■ | ■ | ■ |
| * *NEW!* SuperMatch 20•T Multi-Mode XL | 2,699 | Trinitron | | | | ■ | ■ | | ■ |
| *E-Machines 19" Color (T19 II)* | 2,399 | Trinitron | | | | ■ | ■ | ■ | ■ |
| D. Mitsubishi 17" Diamond Pro | $1,199 | Trinitron | ■ | | ■ | ■ | ■ | ■ | ■ |
| E. NEC 17" 5FG Color | 1,329 | NEC | ■ | | ■ | ■ | ■ | ■ | |
| F. Seiko Instruments 17" CM1760LR | 1,249 | Trinitron | ■ | | ■ | ■ | | ■ | ■ |
| G. Sony 17" | 1,149 | Trinitron | ■ | | ■ | ■ | | ■ | ■ |
| H. RealTech 17" Multi-Mode | 995 | Hitachi | ■ | | ■ | ■ | | ■ | ■ |
| I. RasterOps 16" (RasterOps Sweet 16) | $1,959 | Panasonic | | | ■ | | | | ■ |
| * E-Machines 16" Color (ColorPage T16) | 1,299 | Trinitron | ■ | | ■ | ■ | | ■ | ■ |
| J. NEC 15" 4FG Color | 789 | NEC | ■ | | ■ | ■ | | ■ | |
| K. Radius 15" Precision Color Pivot | $959 | Non-Trinitron | ■ | ■ | ■ | ■ | | ■ | ■ |
| L. Sigma 15" Grayscale (PageView GS) | 579 | Phillips | | ■ | | | | | ■ |
| M. RealTech 15" Grayscale | 449 | — | | ■ | | | | | ■ |
| *Sigma 15" Grayscale (Power Portrait)* | 659 | Phillips | | ■ | | | | | ■ |
| *NEC 15" 3FGX Color* | 669 | NEC | ■ | | ■ | ■ | | ■ | |
| N. Seiko Instruments 14" Color (CM1445) | $499 | Trinitron | ■ | | | | | | ■ |
| O. Sony 13" Color | 689 | Trinitron | ■ | | | | | | ■ |

* shown above

*Your Hardware That Fits partner will tell you which monitors are on-board compatible, and which ones require a card or cable.*

| Don't know which card is compatible with your CPU & monitor? Call us toll-free. | Price | Maximum resolution | Accelerated |
|---|---|---|---|
| **RASTEROPS** | | | |
| ProColor 32 | $3,099 | 1152 x 870 | ■ |
| PaintBoard 24 | 1,559 | 1152 x 870 | ■ |
| 8XL | 469 | 1152 x 870 | |
| PaintBoard Li (24) | 829 | 1024 x 768 | ■ |
| *24STV** | 779 | 640 x 480 | ■ |
| *MediaTime** | 1,549 | 640 x 480 | |
| **SUPERMAC** | | | |
| Spectrum/24 PDQ Plus | $1,549 | 1152 x 870 | ■ |
| Spectrum/8 LCII, IIsi | 499 | 1152 x 870 | |
| Spectrum/8 NuBus | 419 | 1024 x 768 | |
| Spectrum/24 Series IV | 829 | 1024 x 768 | ■ |
| Spectrum/8•24 PDQ | 829 | 640 x 480 | |
| Spectrum/8•24 | 579 | 640 x 480 | |
| *Video Spigot** | 369 | 160 x 120 | |
| *Video Spigot & Sound** | 479 | 160 x 120 | |
| **RADIUS** | | | |
| Precision Color 24X | $1,649 | 1152 x 882 | ■ |
| Precision Color 8XJ | 499 | 1152 x 882 | ■ |
| Precision Color 24XK | 829 | 1024 x 768 | ■ |
| Precision Color 24XP | 499 | 832 x 624 | ■ |
| *Video Vision** | 1,979 | 640 x 480 | |
| **E-MACHINES** | | | |
| ColorLink DC/T (8-bit with Ethernet) | $519 | 1024 x 768 | ■ |
| ColorLink SX/2 (24-bit with Ethernet) | 649 | 1024 x 768 | ■ |
| Futura SX24 | 499 | 1024 x 768 | ■ |
| DoubleColor LX (8) | 699 | 1152 x 870 | ■ |

**24-bit; captures up to 30 frames per second*

### Wacom Cordless Digitizing Tablets

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Cordless, pressure sensitive stylus translates your pen-strokes into line width, spray density, color changes, and other programmable effects. Paint, draw, trace, and point as naturally as if you were writing. The standard tablet has a plain surface. The electrostatic tablet is ideal for video graphics, photo retouching, and print pre-press work.

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***Wacom (SD Series)***
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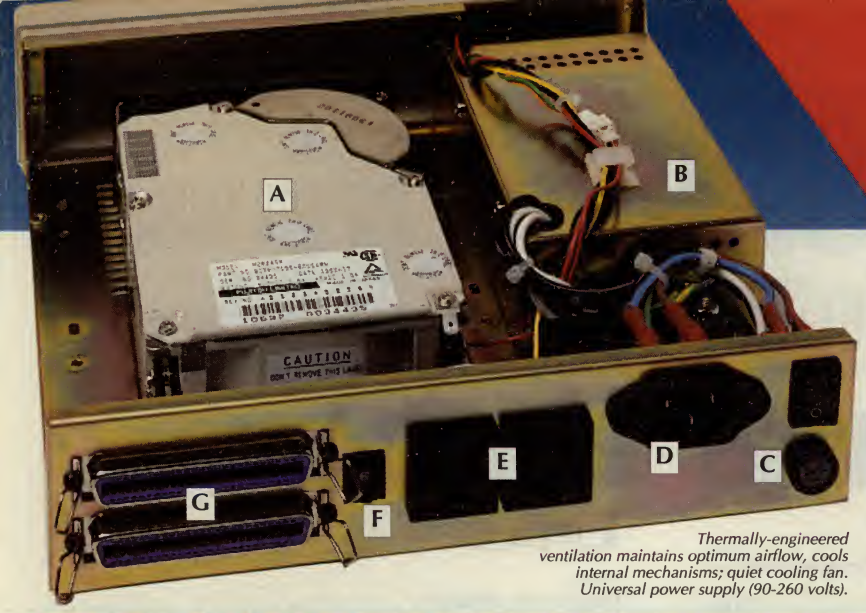
12" x 12" Standard ..... 689
12" x 12" Electrostatic ..... 759
12" x 18" Standard ..... 1029
12" x 18" Electrostatic .... 1099

# Your one-stop source for Mac solutions.

# Hard drives




*Thermally-engineered ventilation maintains optimum airflow, cools internal mechanisms; quiet cooling fan. Universal power supply (90-260 volts).*

## Name-brand mechanisms in the highest-quality enclosure available

## WHY OUR DRIVES ARE SUPERIOR

- *Fast access times*
- *top-level warranties on all mechanisms*
- *optimum MTBF*
- *2-year warranty on enclosure*
- *and...*

**A.** *We use the highest quality name-brand mechanisms available; fully tested and burned in*

**B.** *Shielded 40 watt power supply (65 watt for FH drives) keeps the drive free of interference, your data free of corruption*

**C.** *External fuse keeps fuse replacement simple*

**D.** *Power cable plug-in*

**E.** *Two switched outlets provide power to additional peripherals, allowing 1-step system power-up*

**F.** *Easy-to-use pushbutton SCSI I.D. selector switch*

**G.** *Two 50-pin SCSI connectors for simple configuration*

*(Not shown) Premium double-shielded 26-inch Mac-to-SCSI cable prevents electronic interference*

| *Do you need a fixed hard drive, or the flexibility of a floptical? Call us; we can explain your options.* | Model number | Price (Internal) | Price (External) | Formatted Mac capacity | Avg. access time | Transfer rate* | MTBF** (hours) | Form factor | Warranty (years) |
|---|---|---|---|---|---|---|---|---|---|
| **40 - 120 Mb** | | | | | | | | | |
| Conner 85 | CP-30080E | $209 | $279 | 82 Mb | 17 ms | 1.5 | 150,000 | 3.5 LP | 1 |
| Quantum 85 ELS | ELS85 | 209 | 279 | 82 Mb | 17 ms | 1.4 | 250,000 | 3.5 LP | 2 |
| Conner 120 | CP-30100 | 279 | 349 | 116 Mb | 17 ms | 1.5 | 150,000 | 3.5 LP | 1 |
| Maxtor 120 | 7120XT | 239 | 309 | 121 Mb | 15 ms | 1.5 | 150,000 | 3.5 LP | 2 |
| **120 - 250 Mb** | | | | | | | | | |
| Quantum 127 | ELS127 | $279 | $349 | 124 Mb | 17 ms | 1.4 | 250,000 | 3.5 LP | 2 |
| Conner 170 | CP-30170E | 289 | 359 | 160 Mb | 9 ms | 1.5 | 150,000 | 3.5 LP | 1 |
| Quantum 170 ELS | ELS170 | 299 | 369 | 160 Mb | 17 ms | 1.4 | 250,000 | 3.5 LP | 2 |
| Conner 212 | CP-30200 | 369 | 439 | 206 Mb | 12 ms | 2.5[1] | 150,000 | 3.5 LP | 1 |
| Maxtor 213 | 7213 | 329 | 399 | 207 Mb | 15 ms | 2.8 | 150,000 | 3.5 LP | 2 |
| Quantum 240 | LPS240 | 389 | 459 | 234 Mb | 10 ms | 1.4 | 250,000 | 3.5 LP | 2 |
| Maxtor 245 | 7245 | 359 | 429 | 246 Mb | 15 ms | 3.0 | 150,000 | 3.5 LP | 2 |
| Seagate 248 | ST3283N | 519 | 589 | 235 Mb | 12 ms | 3.0[2] | 250,000 | 3.5 LP | 1 |
| **320 - 570 Mb** | | | | | | | | | |
| Maxtor 340 | LXT-340 | $599 | $669 | 324 Mb | 15 ms | 2.1[1] | 150,000 | 3.5 HH | 2 |
| Fujitsu 425 | M2623FA | 899 | 969 | 405 Mb | 9 ms | 2.7[1] | 200,000 | 3.5 HH | 5 |
| Seagate 426 | ST1480N | 919 | 989 | 426 Mb | 14 ms | 2.6[1] | 150,000 | 3.5 HH | 1 |
| Fujitsu 520 | M2624FA | 939 | 1009 | 496 Mb | 9 ms | 2.7[1] | 200,000 | 3.5 HH | 5 |
| Quantum 525 LPS | LPS525 | 959 | 1029 | 500 Mb | 10 ms | 3.2[1] | 250,000 | 3.5 LP | 2 |
| Seagate 525 | ST1581N | 1029 | 1099 | 525 Mb | 14 ms | 4.0[2] | 150,000 | 3.5 HH | 1 |
| Maxtor 540 | MXT-540 | 989 | 1059 | 546 Mb | 9 ms | 5.5[1] | 300,000 | 3.5 HH | 2 |
| Conner 540 | CP-3540 | 899 | 969 | 515 Mb | 12 ms | 5.5[2] | 150,000 | 3.5 HH | 1 |
| Micropolis 560 | M2105 | 1069 | 1139 | 560 Mb | 10 ms | 5.0[1] | 300,000 | 3.5 HH | 5 |
| **660 Mb - 1.05 Gb** | | | | | | | | | |
| Seagate 663 | ST4766N | $1119 | $1219 | 645 Mb | 15.5 ms | 1.8 | 150,000 | 5.25 FH | 1 |
| Seagate 676 | ST4767N | 1519 | 1619 | 645 Mb | 11.9 ms | 3.0[1] | 150,000 | 5.25 FH | 1 |
| HP 677 | 97556 | 1469 | 1569 | 620 Mb | 13.5 ms | 2.8[1] | 150,000 | 5.25 FH | 5 |
| Quantum 700 | PRO700 | 1249 | 1319 | 700 Mb | 10 ms | 2.9[1] | 350,000 | 3.5 HH | 2 |
| Toshiba 877 | MK-438FB | 1099 | 1169 | 830 Mb | 12.5 ms | 3.0[1] | 200,000 | 3.5 HH | 2 |
| Quantum 1050 | PRO1050 | 1419 | 1489 | 1000 Mb | 10 ms | 2.9[1] | 350,000 | 3.5 HH | 2 |
| HP 1050 | 97558 | 1649 | 1749 | 987 Mb | 13.5 ms | 2.8[1] | 150,000 | 5.25 FH | 5 |
| Seagate 1050 | ST11200N | 1649 | 1719 | 1000 Mb | 10.5 ms | 5.1[2] | 200,000 | 3.5 HH | 1 |
| **1.1 - 3.6 Gb** | | | | | | | | | |
| Fujitsu 1.2 | M2266 | $1249 | $1349 | 1079 Mb | 14.5 ms | 3.0[1] | 200,000 | 5.25 FH | 5 |
| HP 1.2 | C2247 | 1589 | 1659 | 1000 Mb | 10.5 ms | 5.3[1] | 300,000 | 3.5 HH | 5 |
| Micropolis 1.2 | M2112 | 1449 | 1519 | 1005 Mb | 10 ms | 5.0[1] | 300,000 | 3.5 HH | 5 |
| Quantum 1.2 | PRO1225 | 1599 | 1669 | 1200 Mb | 10 ms | 2.9[1] | 350,000 | 3.5 HH | 2 |
| Seagate 1.2 | ST41200N | 1369 | 1469 | 999 Mb | 15 ms | 3.0[1] | 150,000 | 5.25 FH | 1 |
| Toshiba 1.2 | MK-538FB | 1399 | 1469 | 1200 Mb | 12.5 ms | 4.0[1] | 200,000 | 3.5 HH | 3 |
| Maxtor 1.24 | MXT-1240 | 1549 | 1619 | 1240 Mb | 9 ms | 4.5[1] | 300,000 | 3.5 HH | 3 |
| Conner 1.3 | CP-31370 | 2059 | 2129 | 1030 Mb | 10.5 ms | 6.0[1] | 250,000 | 3.5 HH | 1 |
| Micropolis 1.5 | M1528 | 2299 | 2399 | 1341 Mb | 14.5 ms | 2.9[1] | 150,000 | 5.25 FH | 5 |
| Micropolis 1.6 | M1548 | 2379 | 2479 | 1748 Mb | 14 ms | 4.8[1] | 150,000 | 5.25 FH | 5 |
| Seagate 1.6 | ST41651N | 1899 | 1999 | 1352 Mb | 15 ms | 4.0[2] | 150,000 | 5.25 FH | 1 |
| Fujitsu 2.0 | M2652 | 2299 | 2399 | 1752 Mb | 11 ms | 4.8[2] | 200,000 | 5.25 FH | 5 |
| Seagate 2.1 | ST42100N | 1999 | 2099 | 1900 Mb | 12.9 ms | 3.9[2] | 150,000 | 5.25 FH | 5 |
| Fujitsu 2.4 | M2654 | 2549 | 2649 | 2000 Mb | 11 ms | 4.8[2] | 200,000 | 5.25 FH | 5 |
| Micropolis 2.4 | M1924 | 2649 | 2749 | 2100 Mb | 11.5 ms | 4.8[2] | 250,000 | 5.25 FH | 5 |
| Seagate 2.4 | ST42400N | 2879 | 2979 | 2050 Mb | 11 ms | 4.5[2] | 150,000 | 5.25 FH | 5 |
| HP 2.4 | C3010 | 2899 | 2999 | 2000 Mb | 11.5 ms | 5.3[2] | 300,000 | 5.25 FH | 5 |
| Seagate 3.4 | ST43400N | 3999 | 4099 | 2750 Mb | 11 ms | 6.0[2] | 200,000 | 5.25 FH | 5 |
| Micropolis 3.6 | M1936 | 4199 | 4299 | 3022 Mb | 12 ms | 6.0[2] | 250,000 | 5.25 FH | 5 |

* Transfer rate (or throughput) depends on your Mac CPU and system configuration. For more information, ask your Hardware That Fits sales partner. **MTBF=Mean Time Between Failure *LP=Low Profile HH=Half Height FH=Full Height*

[1] SCSI-2 [2] SCSI-2 Fast ***These drives are most efficient when used with a Macintosh Quadra 800, 950 or a RealTech SCSI-2 card.***

### REMOVABLES*

**REALTECH® FLOPTICAL®**
**21 Mb Drive** *(w/1 disk)*.....$339
*Drive w/Diskette 5-pack*.....399

**REALTECH MAGNETO-OPTICAL**
**128 Mb Drive** *(w/1 disk)*.....$1069
*Drive w/Diskette 5-pack*.....1229
**Maxoptix Tahiti IIm Drive**(652/1.0 Gb capacity; 35 ms access time; 1 yr. warranty).....$3269

**REALTECH TAPE BACKUP**
Includes Retrospect 2.0 backup software.
**TEAC 155 Mb Drive**.....$499
**TEAC 600 Mb Drive**.....749

**REALTECH DAT**
**DDS-DC Drive** (2-5 Gb capacity; 1 yr. warranty; includes Retrospect 2.0 backup software).....$1399
*The RealTech DAT Drive uses industry-standard DDS-DC compression on a 90-meter tape. Depending on your data, storage capacities may vary from 4 to 8 Gb.*

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**88c Mb Drive**.....599

***Includes one disk or tape***

### REMOVABLE MEDIA

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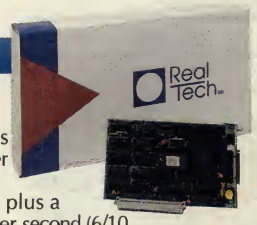
*5-pack of Optical Diskettes*.....209
*652 Mb M-O Cartridge*.....99
*1.0 Gb ZCAV M-O Cartridge*.....239
*155 Mb TEAC Tape*.....$19
*600 Mb TEAC Tape*.....28
*60-meter DAT Tape*.....$13
*90-meter DAT Tape*.....16
*44 Mb SyQuest Cartridge*.....$63
*88 Mb SyQuest Cartridge*.....97
*90 Mb Bernoulli Cartridge*.....$Call
*150 Mb Bernoulli Cartridge*.....Call

### REALTECH DRIVE SOFTWARE

*Included with your drive,* for efficient operation. Disk partitioning; password protection; diagnostic testing; multiple SCSI-bus support; extensive on-line help; and more. Also included with your drive, System 7.01.

### REALTECH SCSI-2 CARD




Allows all NuBus Macs to communicate with newer, high-performance hard drives at substantially faster transfer rates. Sustained transfer rate of up to 4.4 Mb per second, plus a burst transfer rate of 6 Mb per second (6/10 on a Quadra). Mirroring capabilities.....$299

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## YOU'VE BEEN BUYING FROM US SINCE 1985.

*To a lot of you, we've become a trusted business partner. So when you told us we needed to offer you more storage options, we listened.*

***Our systems engineers have worked tirelessly to design the best possible enclosure for name-brand mechanisms.***

***The result? These drives are the value you've been looking for—priced right, and built with the quality your irreplaceable data demands.***

*During the past eight years, we've become America's one-stop source for Macintosh solutions. Now we can be your one-stop source for storage solutions, too. Because we're the company you can trust to give you the very best...*

- **QUALITY**
- **SERVICE**
- **VALUE**

*Stack up our drives against the "best of the best" and they'll come out on top. You can trust us to always bring you the highest-quality Mac hardware!*

## *Limited time offer!*

***Included FREE with your drive...award-winning Now Utilities (Version 4.0.1).***

Includes 7 powerful utilities: Startup Manager, Super Boomerang, WYSIWYG Menus, Now Profile, and much more. Use Now Utilities to maximize System 7's capabilities, and to simplify using your Mac.

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## Hard Drives

### CONNER

| Unformatted Capacity | Access Time | Internal | External |
|---|---|---|---|
| 3.5" Disk Drives (2 year Warranty) | | | |
| 42 mb LPS | 17 ms | $168 | $228 |
| 85 mb LPS | 17 ms | $198 | $248 |
| 120 mb LPS | 12 ms | $258 | $308 |
| 170 mb LPS | 12 ms | $268 | $328 |
| 212 mb LPS | 9 ms | $358 | $409 |
| 540 mb | 8.5 ms | $868 | $928 |

### QUANTUM

| | | | |
|---|---|---|---|
| GO•Drive 2.5" Hard Drive (All Quantums - 2 year Warranty) | | | |
| 80 mb | 17 ms | $319 | $419 |
| 120 mb | 17 ms | $449 | $549 |
| 160 mb | 17 ms | $499 | $599 |
| ELS Series (3.5" Low Profile and Low Power Drives) | | | |
| 42 mb | 19 ms | $175 | $229 |
| 85 mb | 17 ms | $199 | $259 |
| 127 mb | 17 ms | $269 | $319 |
| 170 mb | 17 ms | $299 | $349 |
| LPS Series (3.5" Low Profile and Low Power Drives) | | | |
| 240 mb | 10 ms | $369 | $449 |
| 525 mb | 10 ms | $899 | $979 |
| Prodrive Series (3.5" Half Height Drives) | | | |
| 700 mb | 10 ms | $1179 | $1239 |
| 1.0 Gig | 10 ms | $1329 | $1399 |
| 1.2 Gig | 10 ms | $1479 | $1579 |

### TOSHIBA

| | | | |
|---|---|---|---|
| 3.5" & 2.5" Disk Drives (2 year Warranty) | | | |
| 2.5" 213 mb | 12 ms | $599 | $699 |
| 3.5" 830 mb | 12 ms | $1029 | $1089 |
| 3.5" 1.2 Gig | 12 ms | $1329 | $1389 |

### FUJITSU

| | | | |
|---|---|---|---|
| 3.5" & 5.25" Disk Drives (5 year Warranty) | | | |
| 3.5" 330 mb | 9 ms | $838 | $888 |
| 3.5" 520 mb | 9 ms | $878 | $949 |
| 3.5" 1.1 Gig | 8.5 ms | $1548 | $1599 |
| 5.25" 1.2 Gig | 11.5 ms | $1248 | $1348 |
| 5.25" 2.06 Gig | 11.5 ms | $2119 | $2219 |
| 5.25" 2.4 Gig | 11.5 ms | $2388 | $2488 |

### SEAGATE

| | | | |
|---|---|---|---|
| 3.5" Half Height Drives (1 and 5 year Warranties) | | | |
| 1.2 Gig | 10.5 ms | $1339 | $1399 |
| Wren and Elite Series (5.25" Full Height Drives) | | | |
| Wren 7 1.2 Gig | 15 ms | $1229 | $1339 |
| Wren 8 1.6 Gig | 15 ms | $1649 | $1749 |
| Wren 9 2.1 Gig | 12.5 ms | $1858 | $1949 |
| Elite 1 1.6 Gig | 11.5 ms | $1799 | $1899 |
| Elite 2 2.4 Gig | 11 ms | $2499 | $2599 |
| Elite 3 3.4 Gig | 11 ms | $3399 | $3499 |

## Modems

### PROMETHEUS

| | Price |
|---|---|
| **Ultima Home Office**<br>ext 14.4/14.4SR Fax w/ V.42 bis & voice | $398 |
| **Promodem 144i Internal for Powerbook**<br>14.4/14.4SR Fax w/ V.42 & V.42 bis | $268 |
| **Promodem 144e**<br>ext 14.4/96SR Fax w/ V.42 & V.42 bis | $268 |
| **Promodem 24e** ext 24/96SR Fax w/ V.42 & V.42 bis | $128 |
| **Promodem Mini 2400** 2400 BPS mini, data only | $79 |

### ZOOM TELEPHONICS

| All units come with Microphone LT Software | Price |
|---|---|
| **Faxmodem PBK for Internal Powerbook**<br>96/48 SR Fax w/2400 BPS Modem | $99 |
| **Faxmodem PKT Portable**<br>96/48 SR Fax w/2400 BPS Modem | $109 |
| **Faxmodem FXV**<br>V42 bis/MNP5/2400 BPS, 96/96 SR Fax | $139 |
| **Faxmodem FXV.32**<br>V.32 bis,14.4 data & fax, V.42 bis/MNP5 | $269 |

## Memory

| Model | 60 NS | 70 NS | 80 NS | Model | 60 NS | 70 NS | 80 NS |
|---|---|---|---|---|---|---|---|
| 1x8 | Call | $32 | Call | 2x8 | Call | $62 | Call |
| 4x8 | Call | $131 | Call | 8x8 | Call | Call | $279 |
| 16x8 FX | Call | Call | $549 | 16x8 Q950 | Call | Call | $515 |

We carry most Mac Memory, Please Call for prices!

Memory for LCIII, Centris 610, 650

| | | |
|---|---|---|
| 4mb $131 | 8mb $269 | 16mb $599 |

## Media

| Model | QTY 1 | 5PK | 10PK | Model | QTY 1 | 5PK | 10PK |
|---|---|---|---|---|---|---|---|
| SyQ44 cart | $67 | $65 | $63 | SyQ 88 cart | $107 | $104 | $99 |
| 128mb OPT | $44 | $39 | $37 | 256mb OPT | $86 | $84 | $79 |
| 60mm DAT | $17 | $14 | $12 | 90mm DAT | $19 | $17 | $14 |

## Scanners

### UMAX

| Model<br>Includes free software | Price |
|---|---|
| UC630 - Color w/free Photoshop | $1078 |
| UC1200s - Color w/free Photoshop | $2948 |
| UC840 - Color w/free Photoshop | $1248 |
| Transparency Unit | $698 |
| Auto Document feeder | $398 |
| UG600 - Greyscale w/free Typereader OCR, OFOTO & Publish It | $848 |

### MICROTEK

| Includes free software | |
|---|---|
| Scanmaker II - Color w/free Photoshop LE | $948 |
| Scanmaker IIXE - Color w/free Photoshop | $1248 |

## Accelerators

### DAYSTAR DIGITAL

| Model | Without FPU | with FPU |
|---|---|---|
| 33 MHZ Powercache | $375 | $465 |
| 40 MHZ Powercache | $545 | $635 |
| 50 MHZ Powercache | $714 | $845 |
| Powercache Adapter | | $40 |
| Equalizer LC | $169 | $239 |
| Fast Cache IIsi | $279 | $349 |
| Fast Cache IIci | | $199 |
| Fast Cache Quadra | | $249 |
| Fast Cache Q 950 | | $375 |
| 33 MHZ Turbo 040 | | $1345 |
| Fast Cache Turbo 33-128k | | $335 |

## Optical & DAT Drives

| Includes one free disc (1 year Warranty) | | |
|---|---|---|
| 128 mb Panasonic Optical | 39 ms | $899 |
| 128 mb Epson Optical | 29 ms | $988 |
| 256 mb Most Optical | 31 ms | $1648 |

| Unformatted Capacity | With DIO Backup | With Retrospect |
|---|---|---|
| Includes free 90m Tape & DIO Backup or Retrospect software | | |
| WangTek 2.1 Gig DAT | $998 | $1098 |
| WangDat 5.0 Gig DAT | $1398 | $1498 |

## SyQuest

| Unformatted Capacity | Access Time | Price |
|---|---|---|
| Includes one free cartridge | (2 year Warranty) | |
| 44 mb External | 19 ms | $378 |
| 88 mb External | 19 ms | $478 |
| 88C mb External | 19 ms | $578 |

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## APS Turbo DAT, $1499

**Internal for Quadras $1399**

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### High-quality, high-density storage

This Archive Turbo Python-based SCSI digital audio tape drive combines high capacity with exceptional performance. The APS Turbo DAT can fill your needs as either an easily portable external unit in our new low-profile enclosure or a convenient internal unit for Quadra 900 and 950 models.

### Quick access, dependable performance

APS's Turbo DAT backs up at a rate as high as 17MB per minute, making it the fastest performer in the market. These DATs also come bundled with Retrospect, the standard in tape backup software from Dantz Development (we include Sytos Plus with PC versions), so you get unrivaled performance and ease of use.

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- **Disk-for-disk replacement warranty** • SyQuest, most Quantum , Maxtor and DAT drives are warranted for two years, Maxtor I 2 , I.7 GB and Fujitsu drives are warranted for five years. WREN, Quantum 2.5" drives, TEAC drives, all CD-ROMs ,MOs and SyQuest carts are warranted for one year. Toshiba 830 is warranted for three years.
- **Prices and specifications subject to change without notice. Refused orders subject to restocking fee.**

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DiskFit Direct INCLUDED

**External Quantum 240 $439**

### Quantum

| MB | INTL | EXTL |
|---|---|---|
| 240 | $359 | $439 |
| 525 | 899 | 979 |
| 1225[5] | 1489 | 1559 |

[5]5-year warranty

### Quantum ELS Low Profile Drives

| MB | INTL | EXTL |
|---|---|---|
| 85 | 199 | 269 |
| 127 | 249 | 319 |
| 170 | 279 | 339 |

### Maxtor

| MB | INTL | EXTL |
|---|---|---|
| 120[2] | $229 | $309 |
| 213[2] | 299 | 369 |
| 340[2] | 599 | 669 |
| 540[2] | 969 | 1069 |
| 1240[3] | 1599 | 1699 |

[2]2-year warranty [3]3-year warranty

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| MB | INTL | EXTL |
|---|---|---|
| 560 | $899 | $999 |
| 1.1G | 1499 | 1569 |
| 2.0G | 2699 | 2799 |

Includes 5-year warranty

### Quantum PowerBook Go•Drives

| MB | INTL | EXTL |
|---|---|---|
| 80GRS | $349 | $499[†] |
| 120 | 399 | 529[†] |
| 160GRS | 549 | 679[†] |

†Battery-powered Companion Case for the PowerBook

### Fujitsu

| MB | INTL | EXTL |
|---|---|---|
| 520 | $799 | $899 |
| 1.2G 5.25" | 1249 | 1349 |
| 1.2G 3.5" | 1699 | 1799 |
| 2.0G | 2299 | 2399 |

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| | |
|---|---|
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**Internal for Quadras $969**

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### Toshiba

| MB | INTL | EXTL |
|---|---|---|
| 213 | $599 | $729† |

*†Battery-powered Companion Case for the PowerBook*

| | | |
|---|---|---|
| 1.2G | 1099 | 1199 |

| | | |
|---|---|---|
| CD-ROM 3401-E1 | $599 | $649†† |

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### APS Modems for PowerBooks $69

***2400 baud*** *(9600 send fax/4800 receive fax)*

| | |
|---|---|
| 9600 baud v.32 | $279 |
| 14,400 baud v.32 bis | 349 |

*All APS Modems for the PowerBook include a 30-day MBG, comprehensive installation guide, and APS's Communications & Fax software.*

### SyQuest

MW Editors' Choice

| Model | INTL | EXTL |
|---|---|---|
| SQ555 | $349 | $389 |
| SQ5110 | 469 | 489 |
| SQ5110c | 569 | 599 |

*The 5110c reads & writes 44 & 88 carts!*
*SyQuest Cartridges 44 /88.....$65/100*
*Preformatted Cartridges 44 /88.....$70/105*

### TEAC

MW Editors' Choice

| | |
|---|---|
| 155 MB Tape Back Up | $499 |
| 600 MB Tape Back Up | 799 |

*All APS Tape Drives Include Retrospect by Dantz*

### DAT

New Users Labs ★★★★ MW Editors' Choice

| Model | INTL | EXTL |
|---|---|---|
| APS TurboDAT | $1399 | $1499 |
| APS CompDAT | 1199 | 1299 |
| APS DAT | 1099 | 1199 |

### 128MB MO

| Model | INTL | EXTL |
|---|---|---|
| Epson | $969* | $999 |

*128MB Magneto Optical Drive*
*Internal for Quadra 900 & 950*

- **30-day money-back guarantee** • All drive products carry a 30-day money-back guarantee. Your risk in the transaction is the cost of shipping.
- **Disk-for-disk replacement warranty** • SyQuest, most Quantum , Maxtor and DAT drives are warranted for two years, Maxtor I.2, 1.7 GB and Fujitsu drives are warranted for five years. WREN, Quantum 2.5" drives, TEAC drives, all CD-ROMs ,MOs and SyQuest carts are warranted for one year. Toshiba 830 is warranted for three years.
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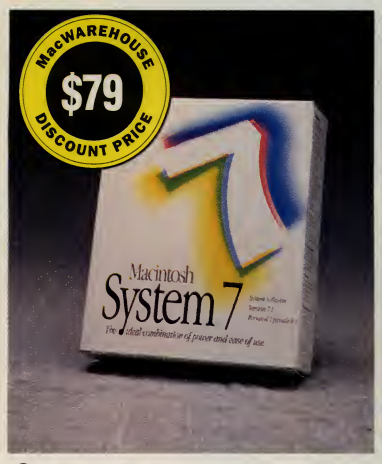


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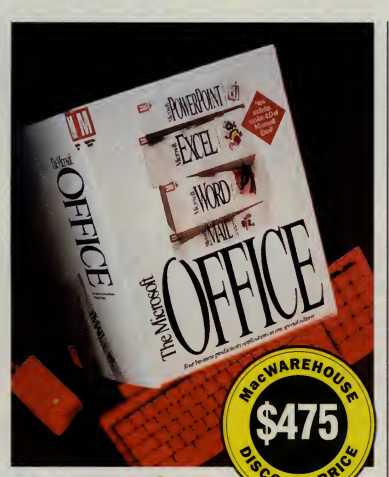


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**UTI0135 Fax*FACTS 6806* $139.**

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**(Maxa)** MAXA's ALERT!™ is essential Desktop Diagnostic™ software that lets you find the source of software conflicts *and fix them!* MAXA's ALERT! helps users find the cause of system crashes and frozen screens before they happen. MAXA's ALERT! diagnoses software on your Mac and reports actual and potential conflicts and problems. The program also consults a database of known conflicts reported by user groups throughout the world to further isolate possible problems. MAXA's ALERT! is fully networkable under System 7. With Alert's responder module, consultants, corporate MIS managers and end-user, can diagnose and repair software conflicts over a network.
**UTI0353 Fax*FACTS 6519* $119.**

## Drive7 2.3

**(Casa Blanca Works)** Drive7 2.3 makes hard disk drives from almost any manufacturer System 7 compatible. With a single button click, it installs up-to-date System 7 drivers on SCSI drives, including SyQuest and Optical removable cartridges, even if the drive was formatted with other formatted software. It supports partitioning, Virtual Memory, and Balloon help.
Rated 4 mice by *MacUser* (2/93).
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## DriveShare

DriveShare 5-User allows you to share many removable drives on your network. It handles SyQuest and Bernoulli cartridge drives, CD-ROM drives, and most optical drives. It works with both System 6 and 7, and on networks having Macs running both.
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## Retrospect Remote

Retrospect Remote® provides automatic, centralized backup and archiving for networked Macs. Just drop an INIT into the system folders of the other Macs on the network and protect their data remotely. **UTI0196 $264.** *Also available:* **10-Pack UTI0200 $147** and **50-Pack UTI0250 $649.**

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**(MicroTouch)** The UnMouse is the innovative input device that goes far beyond the mouse or trackball. For easy cursor control, just slide your finger lightly over the glass, and press to click. Use it simultaneously as a programmable keypad by simply pressing on a touch zone to execute a command, macro or any combination of keystrokes. Or use the stylus to turn the UnMouse into a mini graphics tablet. It's versatile, powerful and fun. And there's nothing else like it! *Requires: Mac SE or II family.*
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FolderBolt-Protect your folders and applications from changes, copying or unauthorized access or use. It's fully integrated into the desktop and locking and unlocking is as easy as a simple shift click.
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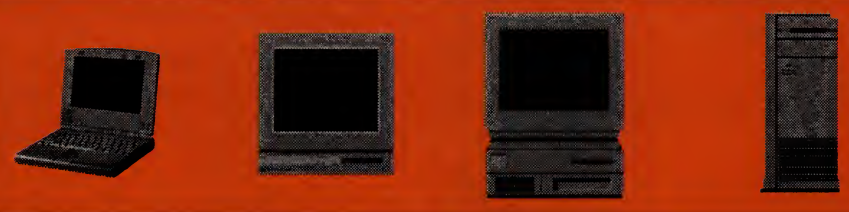

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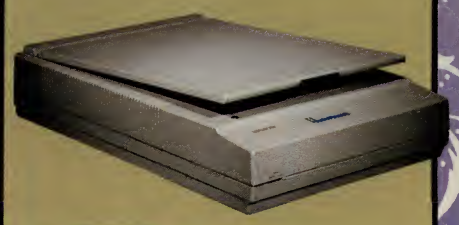

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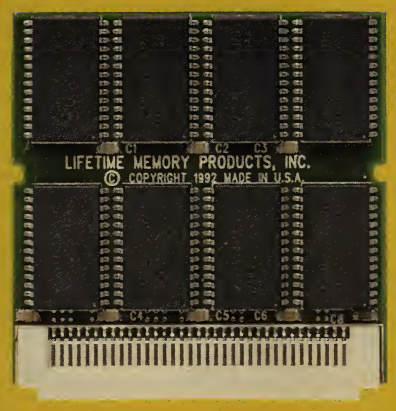


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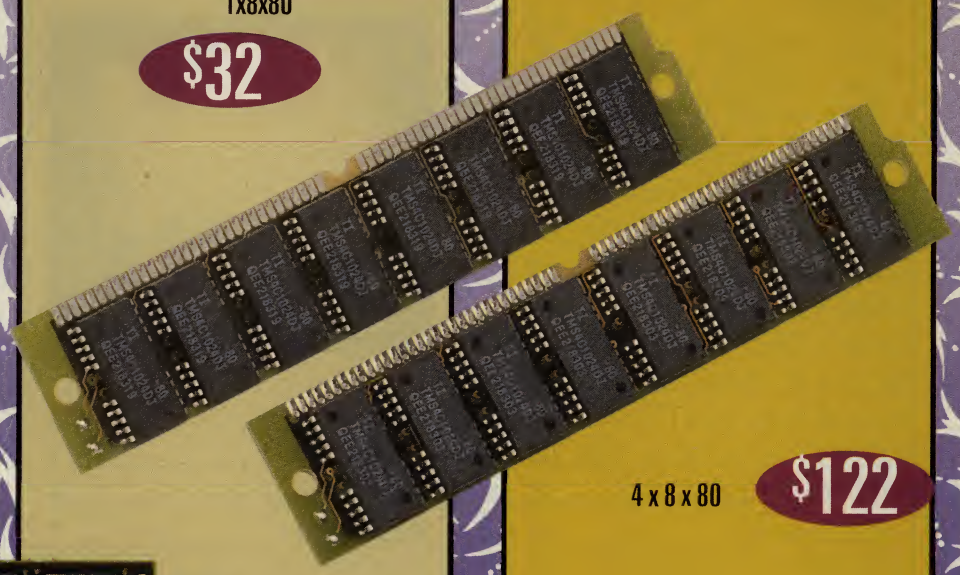

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| 1x8x100 | 31 |
| 1x8x80 (fx) | 34 |
| 1x8x70 (fx) | 36 |
| 2x8x80 | 61 |
| 2x8x70 | 63 |
| 4x8x80 | 122 |
| 4x8x70 | 124 |
| 4x8x80 (fx) | 124 |
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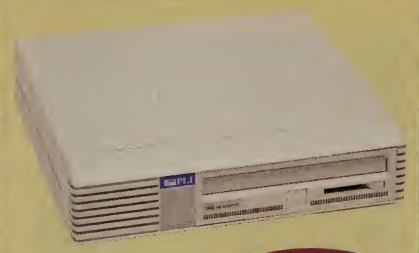

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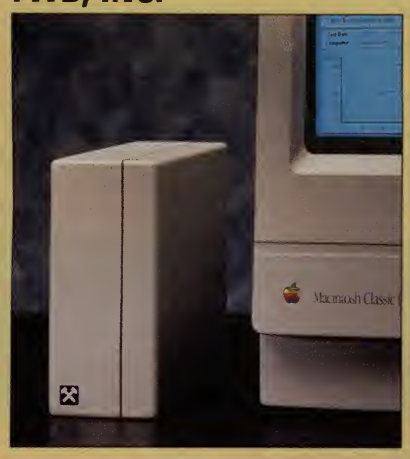


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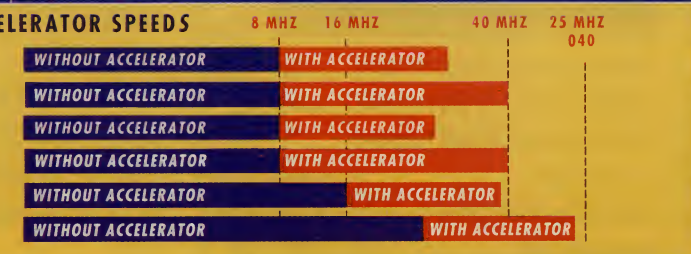
| QUADRA 700/900/950 | 256K VRAM |
| MACINTOSH IICI/IISI | CACHE CARD |

### TechWorks Accelerator Speeds

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THE SOURCE FOR DIRECT BUYERS OF MACINTOSH PRODUCTS, SERVICES AND INFORMATION

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MET

**MAC PRODUCTS SINCE 1987!**

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**DAYSTAR DIGITAL**

| | |
|---|---|
| **Accelerators for SE/30, LC, II, IIx, IIcx, IIsi, IIci.** | |
| Power Cache 33mhz | $379. |
| w/68882 math chip | $459. |
| Power Cache 40mhz | $549. |
| w/68882 math chip. | $639. |
| Power Cache 50mhz | $699. |
| w/68882 math chip | $849. |
| NEW! Charger/DSP | $799. |
| **CACHE CARDS** | |
| Combo Cache IIsi | $219. |
| w/20mhz math chip | $289. |
| Fast Cache IIci-32k | $159. |
| 128k Fast Cache Quadra 700 & 900 | $249. |
| Quadra 700, 900 & 950 | $379. |
| Fast Cache Turbo-128K -for 25MHZ/040 | $249. |
| Fast Cache Turbo-128K -for 33MHZ/040 | $339. |
| Equalizer LC | $169. |
| w/16mhz math chip | $249. |
| Power Math | $109. |
| RAM Power Card-Omb | $419. |

**TECHWORKS.**

| | | |
|---|---|---|
| SE & Classic | 25mhz | $429. |
| w/FPU | | $469. |
| SE & Classic | 40mhz | $469. |
| w/FPU | | $589. |
| LC Accelerators 040 w/FPU | | $799. |
| NuBus Cards 040/25mhz | | $1489. |
| 040/33mhz | | $1789. |

**ACCELERATORS FROM LOGICA**

| | |
|---|---|
| LogiCache 50MHZ Accelerator | $659. |
| w/ FPU | $759. |
| MacIIsi accelerator adapter | $65. |

**SPECIALS!**

| | |
|---|---|
| **LC III, CENTRIS, Q800** | |
| 1M x 32 SIMMs | $135 |
| 2M x 32 SIMMs | $280 |
| **DAYSTAR** | |
| NEW! Turbo 040/25 MHZ | $1079. |
| NEW! Turbo 040/33 MHZ | $1329. |

**memory**

| | |
|---|---|
| 1Mx8 | $32. |
| 1Mx8 FX/NTX | $35. |
| 1Mx8 2-CHIP | $29. |
| 2Mx8 | $59. |
| 4Mx8 | $125. |
| 4Mx8 (II,IIx) | $132. |
| 4Mx8 FX | $128. |
| 16Mx8 | $499. |
| 16Mx8 (700/950) | $539. |
| 16Mx8FX | $519. |
| MACINTOSH CLASSIC | $39. |
| LC VIDEO RAM | $49. |
| LC CO-PROCESSOR (16MHz) | $55. |
| SI CO-PROCESSOR | $119. |
| SI CACHE CARD | $135. |
| CI CACHE CARD | $125. |
| CLASSIC II CO-PROCESSOR | $55. |
| QUADRA VRAM 80ns | $31. |
| POWERBOOK 100 2M | $89. |
| POWERBOOK 100 6M | $289. |
| POWERBOOK 140/170 2M | $89. |
| POWERBOOK 140/170 4M | $159. |
| POWERBOOK 140/170 6M | $249. |
| POWERBOOK 160/180 6M | $249. |
| POWERBOOK 160/180 10M | $450. |
| DUO 210/230 8M | $329. |
| HP LASERJET 2P/3 4MB | $135. |

*pricing subject to change*

**SIGMA DESIGNS MONITORS**

| | |
|---|---|
| *for 160, 180, & Duo's* | |
| PageView GS 15" | $499 |
| Anti-glare | $539 |
| Color Max 15 Color Display | $789 |
| *for Powerbooks, Plus, SE's & Classic's* | |
| Power Portrait | $639 |

**TWINCOM** *internal fax/modems*

| | |
|---|---|
| 24/96 PowerTwin | $119 |
| 14.4/14.4 PowerTwin | $299 |
| **MET 9624PF** (pocket fax) | $99 |

**BTi BATTERY TECHNOLOGY, INC.**

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|---|---|
| PowerBook Battery (ex. 100) | $59 |
| Battery Charger (Full Cycle) *includes auto adaptor* | $89 |
| Battery Kit *includes battery and charger* | $139 |

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35 South Street, Hopkinton, MA 01748
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- 1 Meg Upgrade for Mac SE, SE30, Plus, LC, II, Classic, Classic II, IIx, IIci, IIsi, IIcx, IIfx, Quadra 700 and 900, LaserWriter II NTX, TI Microlaser & HP Laserjet.
- 2 Meg Upgrade for Mac IIci, Classic II, LC, IISi & HP Laserjet
- 4 Meg Upgrade for Mac SE30, II, IIx, IIcx, IIci, Clasic II, LC, IIsi, IIfx, HP Laserjet, LaserWriter II NTX, Quadra 700 & 900
- 6 Meg Upgrade for Powerbook 140 & 170
- 16 Meg Upgrade for Quadra 700 & 900
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**ACCELERATE!**

**NOVY '030 BOARDS** for SE, CLASSIC, PLUS, 512KE — MacUser 4/93

| | Novy ImagePro * SE | Novy ImagePro * Classic/ Plus/512KE | Novy Quik30 SE/Plus/ 512KE | Novy Quik30 Classic |
|---|---|---|---|---|
| 16MHz | 459 | 539 | 339 | 419 |
| 25MHz | 539 | 629 | 389 | 459 |
| 33MHz | 669 | 749 | 499 | 579 |
| 40MHz | 709 | 799 | * includes external video output | |
| 50MHz | 749 | 839 | | |

Add a full page monochrome monitor.....$199

**LogiCache 50MHz** for Mac II, IIci, IIsi, IIx, IIcx, SE30 — MacUser 4/93 $669 — w/ FPU -- $799, Adapter -- $59

**Brainstorm Accelerator** For PLUS & SE
Performance "comparable to the Mac II and LC" (MacWeek)
MAC PLUS: $189 MAC SE: Call

**Harris Labs Performer** For MAC SE & CLASSIC
Performer1 $169 Performer2 $199

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# MEMORY PLUS

## Macintosh Enhancement Products

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### SIMM's

| | |
|---|---|
| 1MX8-100ns..... | $Call |
| 1MX8-80ns..... | $Call |
| 1MX8fx-80ns..... | $Call |
| 2MX8-80ns..... | $Call |
| 4MX8-80ns..... | $Call |
| 4MX8fx-80ns..... | $Call |
| 4MX8-80ns w/Pal. | $Call |
| 8MX8-80ns..... | $Call |
| 16MX8-80ns HP... | $Call |
| 16MX8-80ns LP... | $Call |
| 16MX8fx-80ns..... | $Call |
| Classic 1M/3M..... | $Call |
| New 72 Pin: | |
| 4mb..... | $Call |
| 8mb..... | $Call |
| 16mb..... | $Call |

### UPGRADES

| | |
|---|---|
| IIsi 2 Slot Adaptor..... | $45 |
| IIsi 64K Cache Card..... | $125 |
| LC/LCII 16Mhz FPU..... | $49 |
| LC/LCII 20Mhz FPU..... | $59 |
| Classic II 16Mhz FPU... | $49 |
| Classic II 20Mhz FPU... | $59 |
| IIci 64K Cache Card..... | $115 |
| Sonnet Twin Slot LC..... | $235 |

FPU 's (Chip only)

| | |
|---|---|
| 68882-16Mhz..... | $50 |
| 68882-20Mhz..... | $55 |
| 68882-25Mhz..... | $65 |
| 68882-33Mhz..... | $75 |
| 68882-50Mhz..... | $129 |
| PMMU 68851RC-16Mhz... | $79 |
| XC68040HRC-25M..... | $375 |

### ACCELERATORS

**DAYSTAR DIGITAL**

| | |
|---|---|
| Power Cache 33Mhz..... | $389 |
| w/68882 FPU..... | $475 |
| Power Cache 40 Mhz..... | $550 |
| w/68882 FPU..... | $645 |
| Power Cache 50 Mhz..... | $715 |
| w/68882 FPU..... | $845 |
| 128K Fast Cache - | |
| Quadra 700/900..... | $259 |
| Quadra 700/900/950..... | $389 |
| Turbo 25 Mhz - 040..... | $1089 |
| Turbo 33 Mhz - 040..... | $1339 |
| Equalizer LC w/FPU..... | $259 |
| Charger DSP..... | $809 |
| RAM Power Card..... | $429 |

**LOGICA**

| | |
|---|---|
| Logicache 50 Mhz..... | $689 |
| w/68882 FPU..... | $818 |
| Adaptors..... | $ 65 |

**BRAINSTORM**

| | |
|---|---|
| Plus ,16Mhz..... | $169 |

**NEWER TECHNOLOGY**

| | |
|---|---|
| 700/900 Vari Overdrive..... | $250 |
| FX Overdrive II..... | $250 |

**NOVY QUIK 30**

| | |
|---|---|
| Plus 25 Mhz w/FPU..... | $425 |
| SE 25 Mhz w/FPU..... | $389 |
| Classic 25 Mhz w/FPU..... | $465 |
| Novy Image Pro (Video) - | |
| Plus 25 Mhz w/FPU..... | $625 |
| SE 25 Mhz w/FPU..... | $549 |
| Classic 25Mhz w/FPU..... | $639 |

**TECHNOLOGY WORKS**

| | |
|---|---|
| SE 25 Mhz w/FPU..... | $435 |
| SE 40 Mhz w/FPU..... | $521 |
| Classic 25 Mhz W/FPU..... | $500 |
| Classic 40 Mhz w/FPU..... | $550 |
| LC 040, 25 Mhz..... | $725 |
| NuBus 040, 25 Mhz..... | $1325 |
| NuBus 040, 33 Mhz..... | $1450 |

### VIDEO RAM

| | |
|---|---|
| 512k Module..... | $39 |
| 256k 80ns Module..... | $25 |
| Raster Ops..... | $Call |
| Radius..... | $Call |
| Xante..... | $Call |

### NEW PRODUCTS

**IN STOCK NOW!!!**

Centris 610/650 FPU Upgrade
$375

### SYQUEST

| | |
|---|---|
| External 44MB..... | $399 |
| External 88MB..... | $475 |
| Dual Removable 44/44... | $769 |
| Dual Removable 88/44... | $869 |
| External 5110C 88MB.... | $559 |

**CARTRIDGES**

44MB.....$64
88MB.....$95

Drive packages include: Software, Cable, & Cartridges

## PowerBook Alley

**PSEUDO STATIC RAM**

| MODEL | 100 | 140/170 | 160/180 | 165C |
|---|---|---|---|---|
| 2M | $78 | $78 | $85 | — |
| 4M | $158 | $147 | $158 | $209 |
| 6M | $226 | $211 | $245 | $269 |
| 8M | — | — | $311 | $359 |
| 10M | — | — | $389 | — |

DUO 210/230

4M $195 8M $335

Newer Technology Upgradable DUO Modules

4M Base....$179 4M Upgrade....$210 8M Upgrade....$379

| | |
|---|---|
| MacSac - Slim Carrying Case..... | $29 |
| MacSac - Deluxe Carrying Case..... | $59 |

FULL CYCLE BATTERY CHARGERS

| | |
|---|---|
| PowerBook 100..... | $110 |
| PowerBook 140/145/160/170/180..... | $75 |
| Automobile Power Adaptor..... | $75 |
| Battery for 140/145/160/170/180 ..... | $59 |
| Auxiliary Power Pack (4 X Capacity)..... | $159 |

ALL PB MEMORY SHIPS WITH TOOLS & INSTRUCTIONS

QUANTUM HARD DRIVES

| | |
|---|---|
| GO/120MB..... | $359 |

PSI Internal Fax/Modems

| | |
|---|---|
| PowerModem I..... | $109 |
| PowerModem II..... | $229 |
| PowerModem III..... | $329 |
| PowerModem IV..... | $429 |
| CONNECTIX "CPU" Utilities..... | $40 |

CABLES

| | |
|---|---|
| HDI30 to 50 Pin SCSI..... | $35 |
| HDI30 to 25 Pin System..... | $35 |

### MacSac Carrying Cases

| | |
|---|---|
| LC, IIsi CPU | |
| w/ Extended Keyboard... | $63 |
| Classic, SE, Plus | |
| w/ Extended Keyboard... | $66 |
| w/Standard Keyboard.... | $64 |
| RGB Monitor12", 13"..... | $60 |
| StyleWriter..... | $45 |

### SPECIALS

**NOW IN STOCK**

Newer Technology's Radius Rocket Simms 8MB and 16MB Modules

### LASER RAM

| | |
|---|---|
| TI Micro 1mb..... | $33 |
| TI Turbo 4mb..... | $195 |
| HP LASERJET IV 4mb..... | $135 |
| NEC ModelsII/90/290 2mb..... | $125 |
| NEC Model 95 2mb..... | $89 |
| LaserWriter IIntr 2mb..... | $62 |
| LaserWriter LS 512kb..... | $25 |
| LaserWriter Pro 600/630..... | $Call |

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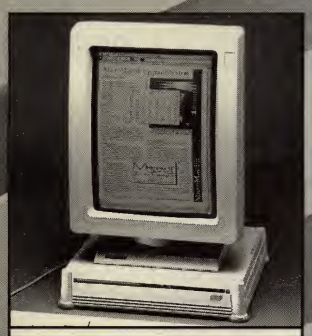
"The MicroMac MultiSpeed 25MHz . . .deserves mention for offering solid performance at an exceptionally low price."
*MacUser,* April 1993

*Upgrade your Mac and save with*

# MacUpgrade Specialists

## Upgrade Tip of the Week



### Recycle Your Mac

Are you one of the three million Mac Plus, SE or SE/30 owners who are frustrated by the slow speed of your Mac and the small 9" monitor? ***Recycle your Mac*** with the MicroMac Upgrade System!

- ✔ Multiply your screen size and accelerate your Mac by converting to a modular system
- ✔ Save desktop space with state-of-the-art slimline enclosure
- ✔ Extend the life of your Mac with new universal power supply and fan
- ✔ Connect either 14" VGA monitor or crisp 15" full page display
- ✔ Add fast, internal hard drive to the MicroMac Plus
- ✔ Add color to your Mac SE/30

**For the Mac Plus**
MicroMac Plus Upgrade System with 25MHz 68030 MultiSpeed Accelerator .....$699

**For the Mac SE**
MicroMac SE Upgrade System with 25MHz 68030 MultiSpeed Accelerator .....$699

**For the Mac SE/30**
MicroMac SE/30 Case.....$299
MicroMac SE/30 with monochrome video card.....$599
MicroMac SE/30 with 8-bit color and 14" Super VGA color monitor .....$999

**Monitors**
15" full page display .....$299

# 25MHz 68030 $298!

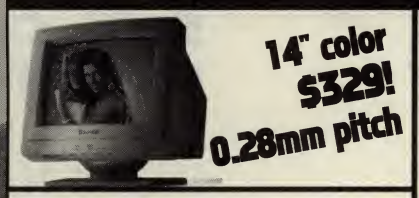
## Get Mac IIci performance for your SE, Plus or Classic with the MicroMac MultiSpeed 25MHz 68030 accelerator

- ✔ Up to 800% performance increase
- ✔ Fully compatible with System 6 and System 7
- ✔ Four SIMM slots for ultra-fast 32-bit memory access
- ✔ Up to 16MB of physical or virtual memory with optional Connectix Virtual 3.0 software
- ✔ 68882 Math co-processor socket
- ✔ Installs in PLUS with optional adapter board

| | |
|---|---|
| 25MHz 68030 MultiSpeed | $298 |
| 32MHz 68030 MultiSpeed | $398 |
| Plus/Classic Adapter Card | $40 |
| 1MB SIMMs 60ns RAM | $37 |
| 1MB SIMMs 45ns RAM | $39 |
| 4MB SIMMs 60ns RAM | $139 |
| Compact Virtual | $80 |
| 25MHz Math Co-Processor | $75 |
| 32MHz Math Co-Processor | $125 |

Increase performance up to 800% by simply connecting the MicroMac MultiSpeed Accelerator to the Classic or Plus' processor with the Adapter Card or by plugging it into the SE's PDS slot.

## Video Products




**14" Relisys color monitor**
.28mm dot pitch, Hitachi tube ....$329
**Greyscale 15" FPD**
Displays 16-level greyscale on your IIsi, IIci and LCIII.....$379
**Monochrome FPD w/video card**
For PLUS, SE, LC, SE/30, II.....$449
**Mac2VGA cable**
Connects cost-effective VGA monitor to Performa 400/600, LC series, IIvi/vx, PowerBook160/180 and Quadras .....$20

## Hard Drives

**NEC 3856, 19ms, 105MB**.....$229
**Quantum, 3.5" ELS, 10ms, 170MB**.....$299
**Quantum, 3.5" LPS, 10ms, 240MB**.....$429
**Quantum, 3.5" LPS, 10ms, 525MB**.....$899
**Quantum, 3.5" half height ProDrive, 10ms, 1.2GB**.....$1,549
**Fuji, 3.5" half height, 9ms, 525MB**.....$899
**Fuji, 5.25"full height 14.5ms, 1.2GB**.....$1,349

## Acceleration

**Applied Engineering,** TransWarp 4300, 40MHz'030 for Mac LC, LCII & Performa 400.....$499
**LogiCache 50MHz '030**
For Mac SE/30, II, IIsi, IIci, IIvx, IIvi, Performa 600.....$679
with FPU (68882).....$779
Adapter for Mac SE/30, II, IIsi, IIcx,.....$69
**Extreme Systems Impact 32MHz '030**
Speeds up your LC, LCII, Performa 400 by 200% to 300%.....$589
with FPU for extremely fast math calculations.....$689
**LC to LCII Upgrade**
Add 68030 and PMMU to get Virtual memory on your LC.....$149
with 68882 math co-processor.....$229
**PMMU for Mac II** (To get Virtual memory for your Mac II).....$79
**FPU (68882) for Mac II** (overall speed improvement).....$69
**FPU for LC and LCII, Classic II**
Plugs into PDS slot (16MHz/25MHz).....$64/$89
**68030 with PMMU for Mobius Accelerator**.....$125
**FPU for Performa 600**.....$125

## CPU/FPU Upgrades

## PowerBook

**Fax/Modem**.....$89
2400 baud, 9600 baud fax send w/manual & software, Apple pulls, almost new
**Adapter Kit f/Hard Drive**.....$29
Adapt your 2.5" PowerBook hard drive to standard 3.5" SCSI connection for use in any Mac!
**ToolKit**.....$10
T8 & T10 Torx wrenches
**Quantum Go Drives**
80MB, 17ms.....$349
120MB, 17ms.....$479
**Fuji** 213MB, 12ms.....$699
Trade-in your low capacity drive

## New Mac Memory

| | LCIII Centris 70ns | Quadra 800 60ns |
|---|---|---|
| 2MB | $90 | $100 |
| 4MB | $145 | $155 |
| 8MB | $279 | $299 |
| 16MB | $619 | $749 |
| 32MB | $1,499 | Call! |

## Upgrade Your PowerBook Memory

| | 2MB | 4MB | 6MB | 8MB | 10MB |
|---|---|---|---|---|---|
| PowerBook 100 | $79 | $189 | $259 | | |
| PowerBook 140/145/170 | $79 | $179 | $239 | | |
| PowerBook 160/180 | $99 | $212 | $279 | $359 | $439 |
| PowerBook 165C | | $249 | $329 | $449 | $599 |
| PowerBook DUO 210/230 | | $209 | | $389 | |

## Hardware

**Applied Engineering HD PLUS**
High density floppy drive (external) for Mac Plus or SE .....$299
**External Hard Disk or Syquest Enclosure**.....$99
including SCSI cable, terminator and formatting software
**SCSI Terminator**.....$12
**SCSI Cable**.....$12
**PhoneNet Connector**.....$15
**PLUS power supply** (w/trade-in)...$85

**ADB Extended Keyboard**
105 keys .....$97
3-pack .....$267

**LC Twin Slot**
Double the LC's expansion slot and "beef up" the power supply ...$249

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## MEMORY UPGRADES

1x8x80 .....30
1x8x70 .....32
1x8x100 .....28.50
2x8x80 .....59.50
2x8x70 .....61.00
4x8x80 .....119
4x8x70 .....121
4x8x80 II/II .....127
4x8x70 II/IIx .....129
8x8x80 .....279
16x8x80 (High profile)...503
16x8x70 (Low profile)....555
1x8x80fx .....32
1x8x70fx .....34
4x8x80fx .....124
4x8x70fx .....126
8x8x80fx .....279
16x8x80fx .....529

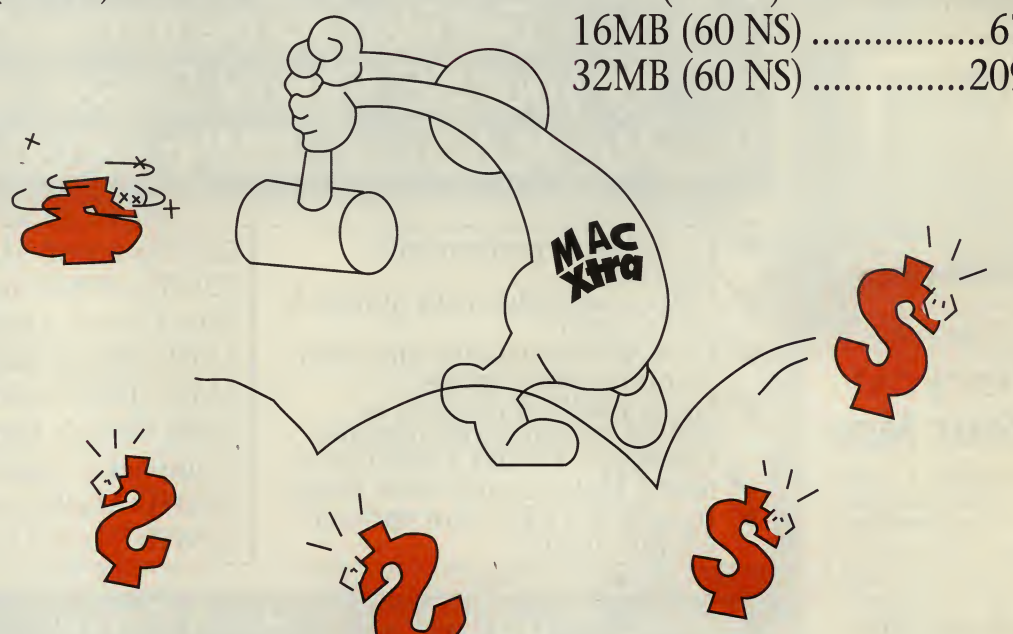
512K VRAM.....49
256K VRAM.....27
1x9x70 .....39.75
4x9x70 .....135
TI Microlaser Upgrade.....39
Tool Kit (Simms Inst.Kit)....7
Tool Kit (PowerBook) ....6.50

## 72-PIN SIMMS

4MB (70 NS) .....120
8MB (70 NS) .....249
16MB (70 NS) .....549

## QUADRA 800 60 NS

4MB (60 NS) .....135
8MB (60 NS) .....269
16MB (60 NS) .....679
32MB (60 NS) .....2099




## POWERBOOK MEMORY

PB100/140/170-2MB .....72
PB100/4MB .....179
PB100-6MB.....259
PB140/170-4MB .....159
PB140/170-6MB .....210
PB160/180-4MB .....195
PB160/180-6MB .....239
PB160/180-8MB .....349
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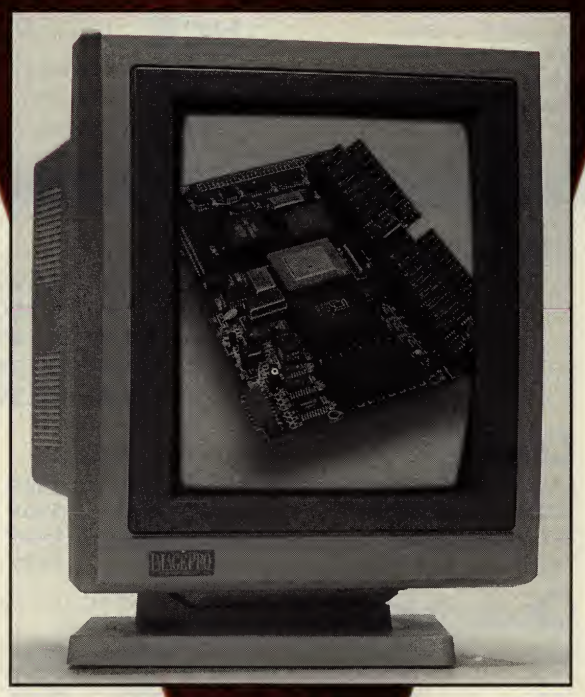

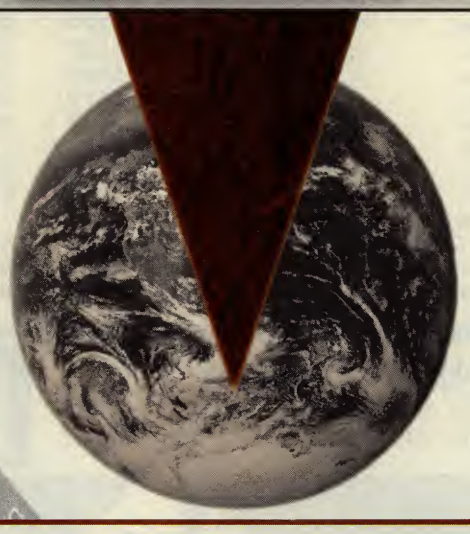

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| 2.0GIG | M2652 | 5.25" | FH | 14ms | $2289 | $2389 |
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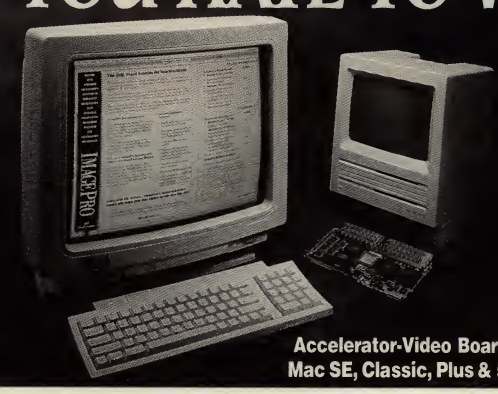


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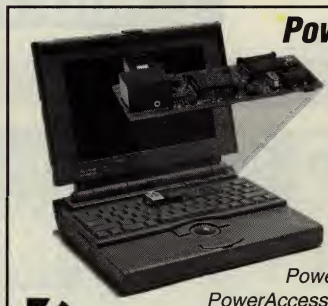

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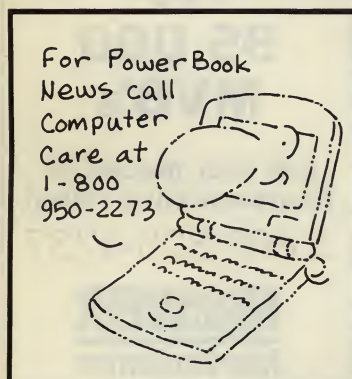


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**Mac SE 1/20 - $499.00**
**Stylewriter - $199.00**

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**Apple Personal Laserwriter LS - $599.00**
**Apple Laserwriter IINT - $995.00**
**Apple Laserwriter IINTX - $1,195.00**
**Radius Pivot Color/Mono - $599.00/375.00**
**Radius TPD Mono - $599.00**
**Mac II 2/0 - $699.00**
**Mac IIcx 2/0 - $949.00**

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Classic II 4/40 - $949.00
Stylewriter - $249.00
Apple IIci Cache Cards - $35.00
Radius Pivot Color/Mono - $799.00/475.00
PowerBook 170 4/40 w/modem - $2599.00

**Mac Parts: (Partial Listing, Call with your needs!)**
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|---|---|
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| 165c 4-80/120 | $2899 / $3095 |
| 180 4-80/120 | $3562 / $3785 |
| **Quadra** | |
| 800 8-230/525 | $3858 / $4398 |
| 800 8-525/1.2 CD | $4868 / $5420 |
| **Centris** | |
| 610 4-80/80 Eth | $1588 / $1688 |
| 650 8-80/230 Eth | $2811 / $3068 |
| 650 8-230/1.2 CD | $3385 / $4398 |
| **Mac CPUs** | |
| LC III 4-80/170 | $1235 / $1355 |
| VX 4-80/230 | $1550 / $1740 |
| VX 5-80/230 CD | $1990 / $2238 |

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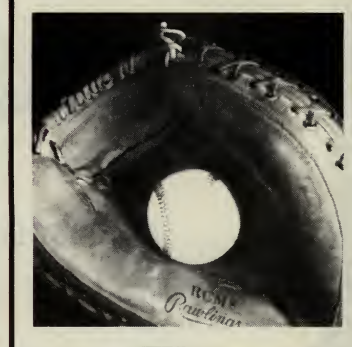

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Division of WCN

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| | | |
|---|---|---|
| 165C | 4/80 | 2895 |
| 165C | 4/120 | 3250 |
| 165C | 4/232 | 3495 |
| 160 | 4/40 | 2195 |
| 160 | 4/80 | 2340 |
| 160 | 4/120 | 2530 |
| 180 | 4/80 | 3495 |
| 180 | 4/120 | 3395 |
| 180 | 14/230 | 4330 |
| Duo 230 | 4/80 | 2195 |
| 230 | 4/120 | 2650 |
| DUO Dock | | 875 |
| PSI | Fax/Modem 14.4 | 420 |

**QUADRA'S**

| | | |
|---|---|---|
| 800 | 8/0 | 3540 |
| 800 | 8/230 | 3790 |
| 800 | 8/525 | 4295 |
| 800 | 64/1.2 | 7395 |
| 800 | 136/2.4 | 13340 |
| 950 | 8/0 | 4350 |
| 950 | 8/200 | 4695 |
| 950 | 16/525 | 5360 |
| 950 | 64/1.2 | 7395 |
| 700 | All Config. | CALL |

**CENTRIS**

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|---|---|---|
| 650 | 4/80 | 2250 |
| 650 | 8/230 | 2995 |
| 650 | 8/230-CD | 3450 |
| 650 | 16/525 | 3795 |
| 610 | 4/80 | 1650 |
| 610 | 8/230 | 2225 |
| 610 | 8/230-CD | 2595 |

**POWERBOOK EXCHANGE**

| | |
|---|---|
| 100 to 160 | 1395 |
| 100 to 140 | 950 |
| 140 to 160 | 975 |
| 140 to 165C | 1550 |
| 170 to 180 | 1695 |
| PORTBL. to 160 | 1795 |

**MAC IIVX**

| | |
|---|---|
| 4/80 | 1595 |
| 5/80-CD | 1995 |

**Si Ci LC III**

| | |
|---|---|
| Si 3/40 | 950 |
| Ci 5/230 | 2495 |
| LC III 4/200 | 1425 |
| Classic Clr4/80 | 1350 |

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|---|---|
| 13"/14" Color | 425/489 |
| 16" Color | 1230 |

**APPLE KYBRD.**

| | |
|---|---|
| Adj. Keyboard | 209 |
| Ext. Keyboard | 145 |
| Gen. Extended | 79 |

**APPLE PRINTER**

| | |
|---|---|
| Pro 630 | 2350 |
| Pro 600 | 1975 |
| IIF/IIG | 2120/2590 |
| Select 300 | 785 |
| Select 310 | 1025 |
| Style Writer II | 349 |

**PRINTERS**

| | |
|---|---|
| HP Desk Writer | 395 |
| HP DW550C | 729 |
| HP Laser 4M | 1895 |
| NewGen | CALL |

**LOGIC BOARDS**

| | |
|---|---|
| Plus | 125 |
| SE | 195 |
| Se/30 | 750 |
| Classic | 295 |
| LC | 395 |
| II/IIX | 450/850 |
| FX | 1395 |
| CX | 695 |
| Ci | 995 |
| Si | 499 |
| 700/900 | 1795 |
| 800 | 2595 |
| 950 | 2595 |
| Port/B.L. | 295/450 |
| NT/NTX | 250/750 |
| IIF/IIG | 900/1095 |
| IIF/IIG | 895/1195 |
| P.B. 180 Proc. | 1395 |
| P.B. 180 Sys.Brd. | 595 |

**DEMO MAC'S**

| | |
|---|---|
| Plus | 350 |
| SE 1/20 | 495 |
| SE/30 2/40 | 1195 |
| Classic 4/40 | 595 |
| LC 2/40 | 695 |
| Mac II 2/40 | 950 |
| MacIIX 2/40 | 1350 |
| MacIIFX 2/40 | 2095 |
| MacIICi 5/80 | 1750 |
| MacIICX 2/40 | 1195 |
| MacIISI 3/40 | 795 |
| Quad 9004/80 | 2950 |
| Quad 9508/80 | 4195 |
| Quad 7004/40 | 2595 |
| Port. 2/40 | 650 |
| P.B. 140 4/40 | CALL |
| P.B.170 4/40 | CALL |
| NT/NTX | 1095/1395 |
| IIF/IIG | 1795/1995 |

**POWER SUPPLY**

| | |
|---|---|
| CI/CX/700 | 225 |
| IIX/II/IIFX | 295 |
| 900/950 | 450 |
| Plus/SE Analog | 135 |

**EXCHANGE YOUR MAC**

| | |
|---|---|
| SE TO SE/30 | 695 |
| Classic to Color | 960 |
| LC TO LCIII | 900 |
| II TO Q700 | 1895 |
| IIFX TO 800 | 2195 |
| CX TO Q700 | 1750 |
| 900 TO 950 | 2395 |
| LS TO 310 | 795 |
| NT TO 600 | 1299 |
| NTX TO 630 | 1495 |

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|---|---|
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| LC III 4/160 | $1315 | Quantum Hard Drives | $CALL | Mac Color Display 16″ | $1139 |
| IIvx 4/80 | $1575 | Turbo Mouse 4.0 | $109 | Apple CD 300 | $545 |
| Centris 610 4/80 | $1545 | Custom Configurations | $CALL | Color One Scanner | $1205 |
| Centris 650 4/80 | $2245 | Software & Peripherals | $CALL | LaserWriter Select 300 | $785 |
| Quadra 800 8/230 | $3565 | *& much, much more!!* | | LaserWriter Pro 600 | $1875 |
| Quadra 950 8/0 | $4285 | *One Year Warranty on all new Macs!* | | Stylewriter II | $335 |
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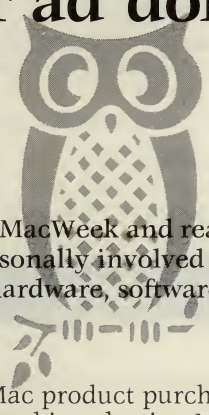

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Source: MacWeek 1992 Study of Microcomputer Product Ownership and Buying Plans

## Computer Systems

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| | |
|---|---|
| PB145 4/40 | $1905 |
| PB145 4/80 | 2220 |
| PB160 4/40 | 2160 |
| PB160 4/80 | 2479 |
| PB160 4/120 | 2795 |
| PB180 | CALL |
| PB165C 4/80 | 3015 |
| PB165C 4/120 | 3335 |
| DUO's | CALL |

**DESKTOPS**

| | |
|---|---|
| Classic II | CALL |
| Color Classic 4/80 | 1325 |
| LCIII 4/80 | 1205 |
| LCIII 4/160 | 1330 |
| IIVX 4/80 | 1610 |
| IIVX 4/230 | 1920 |
| Centris 610 4/80 | 1575 |
| Centris 610 8/230 | 2125 |
| Centris 610 8/230 CD-Rom | 2445 |
| Centris 650 8/230 | 3009 |
| Centris 650 8/230 CD-Rom | 3329 |
| Centris 650 8/500 | 3700 |
| Quadra 800 8/230 | 3745 |
| Quadra 800 8/500 | 4345 |
| Quadra 800 8/500 CD-Rom | 4665 |
| Quadra 800 8/1000 | 5120 |
| Quadra 950 8/230 | 4885 |
| Quadra 950 8/500 | 5480 |
| Quadra 950 16/1000 | 6519 |

**PRINTERS**

APPLE

| | |
|---|---|
| Imagewriter II | $399 |
| Stylewriter II | 315 |
| Apple Clr Printer | 2085 |
| LW Select 300 | 735 |
| LW Select 310 | 965 |
| LW NTR | CALL |
| LW Pro 600 | 1665 |
| LW Pro 630 | 2259 |

HEWLETT PACKARD/MAC

| | |
|---|---|
| 4M | 1869 |
| IIIP/MAC | 1289 |
| Dskwrter | 385 |
| Dskwrter/C | 495 |
| Dskwrter 550C | 695 |
| XL300 | 2205 |

COMPAQ/MAC

| | |
|---|---|
| Pagemarq 15 | 2505 |
| Pagemarq 20 | CALL |

**MONITORS**

RADIUS

| | |
|---|---|
| Mono 15" Pivot | 669 |
| Color 15" Pivot | 890 |
| 19" Mono Dual | 838 |
| 19" Color Multi | 1945 |
| 20" Color Multi | 2245 |
| 21" Mono Dual | 1239 |

SUPERMAC

| | |
|---|---|
| Plat 20" Mono | 865 |
| Sprmtch 17" Color | 1020 |
| Sprmtch 20" Color | 1414 |

RASTER OPS

| | |
|---|---|
| Colorvue 15" Mono | 475 |
| 21" Mono | 949 |
| Sweet 16" Color | 1094 |
| 20" Color | 1265 |

APPLE

| | |
|---|---|
| 12" Mono | CALL |
| 14" Portrait Mono | 719 |
| 14" Color | CALL |
| 16" Color | CALL |
| 21" Color | 2885 |

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## Macintosh

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|---|---|
| Centris 610 8-80 | $1849 |
| Centris 610 8-230 | $2049 |
| Centris 650 4-80 | $2289 |
| Centris 650 8-80 | $2599 |
| Centris 650 8-425 | $3099 |
| Quadra 800 8-230 | $3699 |
| Quadra 800 8M-1GB | $4699 |
| Quadra 950-400 | $5149 |

**MONITORS**

| | |
|---|---|
| SuperMac 21"GS | $1099 |
| SuperMac 21" color | $2480 |
| Radius 20S | $2389 |
| NEC 5FGE | $1169 |
| Sony 17" | $999 |
| Mitsubishi 20" pro | $1985 |
| Nanao - Idek | call |

Power Books

| | |
|---|---|
| DUO 210 4-40 | $1799 |
| DUO 210 4-80 | $2059 |
| DUO 230 4-80 | $2199 |
| DUO 230 4-120 | $2599 |
| 160 4-80 | $2589 |
| 165C 4-80 | $2899 |
| 165C 4-120 | $3139 |
| 180 4-80 | $3649 |
| 180 4-120 | $3799 |

**PRINTERS**

| | |
|---|---|
| HP 4M | $1969 |
| HP PaintWriter | $369 |
| QMS 860 11x17 | $3869 |
| Seiko, Nec, TI | $CALL |

**Centris 610** 230 hard disk, CD, 8 MB Ram — $2589

**Centris 650** 230 hard disk, CD, 8 MB Ram — $3399

Full software and hardware selections

**Quadra 800** CD, 20 MB Ram, 425 Quantum HD — $5199

**Quadra 950** 20 MB Ram, 1.2GB SCSI 2HD — $6199

**Storage devices**

| | |
|---|---|
| 1.2 GB Micropolis 10ms | $1369 |
| Quantom 425S 8ms | $ 699 |
| Fujitsu 520 MB 3 1/2" | $ 859 |
| Fujitsu 1.2 GB 3 1/2" | $1499 |
| Toshiba 1.2 GB SCSI 2 | $1399 |

Pinnacle Micro
650 MB 19ms optical $2899
650 External WORM $2850

Micronet
Q9I-2024R int 4ms $3599
Q9E/E-4260ext.5ms $7785

**CD ROMs**

| | |
|---|---|
| Photo CD ROM 200ms, 650M | $449 |
| PLI Photo CD | $call |
| Toshiba Photo CD | $call |

**DAT drives**

WangDat 5 GB Ext. $1599

**Drive Array**

PLI Mini Array 1GB $4299 Ext. SCSI2 5ms

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| RasterOps 24XLTV | $2659 |
| Truevision Nuvista+ 2mb | $2395 |
| Radius Video Vision | $1899 |
| AGFA Arcus Scanner | $2989 |
| Microtek IIXE-1200 dpi | $1099 |
| Wacom 6x8 Artz tablet | $ 349 |

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## Peripherals

# HOKKINS SYSTEMATION 1-800-526-2328

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|---|---|---|
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| 120 Mb | $228 | $305 |
| 170 Mb | $307 | $385 |
| 213 Mb | $348 | $415 |
| 240 Mb | $365 | $440 |
| 340 Mb | $578 | $645 |
| 525 Mb | $865 | $925 |
| 1.2 Gb | call | call |

Drives available from:
• Conner • Fujitsu
• Maxtor • Quantum
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**CD ROM Drives**
• Texel • Toshiba

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Now offering tape drives from EXABYTE®

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|---|---|---|
| 2.0 Gb | EXB-4200 | call for prices |
| 4.0 Gb | EXB-4200c | |
| (8 mm) | | |
| 2.5 Gb | EXB-8205 | |
| 5.0 Gb | EXB-8505 | |

**TEAC**

| | |
|---|---|
| 600 Mb | $659 |

**128 Mb Optical Drives**

| | |
|---|---|
| Epson (external) | $1050 |
| TEAC (external) | $988 |
| Optical Media | $39 |

**Memory**
1 Mb x 8 - 70 ns $29
4 Mb x 8 - 70 ns $129
Available for all Macintosh Computers

**SyQuest Drives**

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|---|---|---|
| 44 Mb | SQ555 | $415 |
| 88 Mb | SQ5110 | $490 |
| 88 Mb | SQ5110c | $585 |

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| | |
|---|---|
| 44 Mb | $62 |
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| ELS 85 MB | 195 | 255 | Pro 425 MB | 879 | 939 |
| ELS 127 MB | 250 | 310 | LPS 525 MB | 889 | 945 |
| ELS 170 MB | 275 | 335 | Pro 700 MB | 1145 | 1205 |
| GO 120 MB Drive | 375 | 475 | Pro 1050 MB | 1299 | 1359 |
| 160 MB GRS 2.5" | 519 | 619 | Pro 1225 MB 10 MS | 1475 | 1535 |

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| Capacity | Model | Specifications | Int. | Ext. |
|---|---|---|---|---|
| 560 MB | M2105 | 3.5" 10 MS, 5400 RPM FAST SCSI-2 | $945 | $1005 |
| 765 MB | M1624 | 5.25" 14 MS, 5 yr. War. Fast SCSI-2 | $1075 | $1135 |
| 1.2 GB | M2112 | 3.5" 10 MS, 5 yr. War. Fast SCSI-2 | 1375 | 1435 |
| 1.5 GB | M1528 | 5.25" 14 MS, 5 yr. War. Fast SCSI-2 | 1645 | 1765 |
| 2.0 GB | M1548 | 5.25" 14 MS, 5 yr. War. Fast SCSI-2 | 1899 | 2019 |
| 2.4 GB | M1924 | 5.25" 11 MS, 5 yr. War. Fast SCSI-2 | 2589 | 2699 |

*Very Quiet – Great For The Studio!*

## FUJITSU *Plays well with others!*

| Capacity | Model | | Specifications | Int. | Ext. |
|---|---|---|---|---|---|
| 185 MB | M2614 | 3.5" | 17 MS,3 year Warranty | $279 | $339 |
| 330 MB | M2622 | 3.5" | 9 MS, 5 Yr. War. Fast SCSI-2 | 765 | 850 |
| 520 MB | M2624 | 3.5" | 9 MS, 5 Yr. War. Fast SCSI-2 | 765 | 825 |
| 1.2 GB | M2694 | 3.5" | 8.5 MS, 5 Yr. War. Fast SCSI-2 | 1475 | 1535 |
| 1.2 GB | M2266 | 5.25" | 11 MS, 5 Yr. War. Fast SCSI-2 | 1189 | 1309 |
| 2.06 GB | M2652 | 5.25" | 11 MS, 5 Yr. War. Fast SCSI-2 | 2075 | 2195 |
| 2.40 GB | M2654 | 5.25" | 11 MS, 5 Yr. War. Fast SCSI-2 | 2269 | 2389 |

*Extremely Fast !... Fujitsu Reliability*

## HEWLETT PACKARD

| Capacity | Model | Size | Int. | Ext. |
|---|---|---|---|---|
| 1.2 GB | C2247 | 3.5" | $1395 | $1455 |
| 1.2 GB | 97558 | 5.25" | 1555 | 1675 |
| 1.6 GB | 97560 | 5.25" | 1899 | 2019 |
| 2.11 GB | C3009 | 5.25" | 2635 | 2755 |
| 2.35 GB | C3010 | 5.25" | 2755 | 2895 |

*5 Yr. War./Multiple Drive Subsystems Available*

## CONNER

| Capacity | Int. | Ext. |
|---|---|---|
| 85 MB, LPS | $195 | $255 |
| 120 MB, LPS | 245 | 308 |
| 170 MB, LPS | 275 | 335 |
| 212 MB, 12 MS Fast | 355 | 415 |
| 540 MB, 8.5 MS,4500 RPM | 889 | 949 |

*Conner Drives Are Apple Authorized.*

## TOSHIBA

| Capacity | Int. | Ext. |
|---|---|---|
| 1.2 GB12MS, 3.5" | $1379 | $1439 |
| 877 MB 12MS, 3.5" | 1025 | 1085 |
| 213 MB *Power Book Drive* | 639 | 739 |

## UMAX

| | |
|---|---|
| UC 1200 with Adobe Photoshop | $2979 |
| UC 840 with Adobe Photoshop | 1269 |
| UC 630 with Adobe Photoshop | 1085 |
| Auto Doc. Feeder/Transparency | 485/685 |

## POWERBOOK MEMORY

| Model | Capacity | Price |
|---|---|---|
| PowerBook 140/170 | 4 MB | $165 |
| PowerBook 140/170 | 6 MB | 209 |
| PowerBook 160/180 | 4 MB | 189 |
| PowerBook 160/180 | 6 MB | 269 |
| PowerBook 160/180 | 8 MB | 345 |
| PowerBook 160/180 | 10 MB | 395 |

*MADE IN THE USA*LIFE TIME WARRANTY*

## SPECIALS

| Capacity | Int. | Ext. |
|---|---|---|
| 185 MB Fujitsu | $279 | $339 |
| 1.2 GB 3.5" MicropΩlis | 1379 | 1439 |
| 1.5 GB MicropΩlis | 1645 | 1765 |
| 2.0 GB MicropΩlis | 1879 | 1979 |
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| | |
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| ClassicII w/keyboard | $985 |
| LC III 4/80 w/keyboard | $1245 |
| LC III 4/160 w/keyboard | $1365 |
| Centris 610 4/80 | $1625 |
| Centris 610 8/230 | $2175 |
| Centris 650 4/80 | $2345 |
| Centris 650 8/230 | $3065 |
| Quadra 800 8/230 | $3875 |
| Quadra 800 8/500 w/CD | $4735 |
| Powerbooks and Memory | CALL |

**Monitors**

| | |
|---|---|
| *Apple 14"trin* | *$489* |
| *Magnavox 14"* | *$399* |
| Sony 1604S | *$1069* |
| *SuperMac 17T* | *$1049* |
| *Mitsubishi 20"multi* | *$1089* |

**Printers**

| | |
|---|---|
| Stylewriter II | $324 |
| Laserwriter pro 600 | $1850 |
| General Parametrics Spectra Star Q10E | $3399 |

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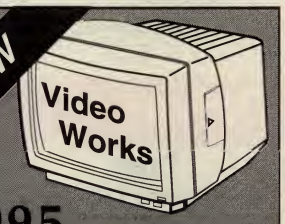


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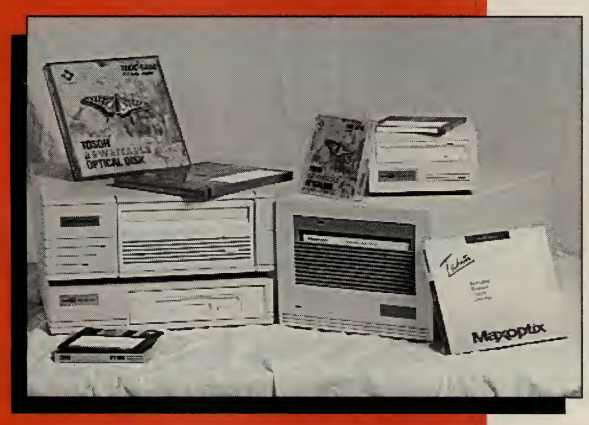


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## Hard Drives

*Includes: SpotOn Formatting Software, Cables*

| Capacity | Speed | RPM | Brand | Warranty | Internal | External |
|---|---|---|---|---|---|---|
| 84Meg | 17ms | 3822 | Conner | 2 Years | $193 | $269 |
| 85Meg | 17ms | 3600 | Quantum | 2 Years | $195 | $275 |
| 127Meg | 17ms | 3600 | Quantum | 2 Years | $259 | $339 |
| 130Meg | 17ms | 3600 | Maxtor | 2 Years | $239 | $319 |
| 170Meg | 17ms | 3600 | Conner | 2 Years | $269 | $349 |
| 213Meg | 15ms | 3600 | Maxtor | 2 Years | $329 | $409 |
| 213Meg | 12ms | 4500 | Conner | 2 Years | $339 | $419 |
| 240Meg | 16ms | 4300 | Quantum | 2 Years | $354 | $425 |
| 340Meg | 13ms | 3600 | Maxtor | 1 Year | $589 | $669 |
| 520Meg | 12ms | 4400 | Fujitsu | 5 Years | $829 | $909 |
| 540Meg | 8.5ms | 6300 | Maxtor | 2 Years | $999 | $1079 |
| 560Meg | 10ms | 5400 | Micropolis | 5 Years | $1059 | $1139 |
| 877Meg | 12ms | 3600 | Toshiba | 5 Years | $1059 | $1139 |
| 1050Meg | 10ms | 5400 | Micropolis | 5 Years | $1319 | $1389 |
| 1080Meg | 9.5ms | 5400 | Fujitsu | 5 Years | $1499 | $1579 |
| 1100Meg | 10.5ms | 5400 | HPackard | 5 Years | $1529 | $1599 |
| 1230Meg | 12ms | 3600 | Toshiba | 5 Years | $1329 | $1399 |
| 1200Meg | 8.5ms | 6300 | Maxtor | 3 Years | $1579 | $1659 |
| 2060Meg | 12ms | 5400 | Fujitsu | 5 Years | $2299 | $2379 |

*We sell the complete lines of all brands shown. We have Disk Array Systems for incredible performance and fault tolerance.*

## Syquest Drives

*Includes: SpotOn Formatting Software, 1 Cartridge, Cables*

| Capacity | Model | Speed | Internal | External |
|---|---|---|---|---|
| 44Meg | SQ555 | 20ms | $349 | $389 |
| 88Meg | SQ5110 | 20ms | $439 | $479 |
| 88Meg | SQ5110C | 20ms | $519 | $559 |

| Media | 44Meg | 44Meg5pack | 88Meg | 88Meg5pack |
|---|---|---|---|---|
| | $64 | $315 | $98 | $479 |

## CD-ROM Drives

*Includes: Trantor Driver Software with Music play software, cables, 1 year warrranty. All CD Drives are Kodak multisession Photo CD Compatible.*

| Brand | Speed | Transfer | Type | Internal | External |
|---|---|---|---|---|---|
| Texel | 265ms | 300KB/sec | Single Disk | $509 | $549 |
| Toshiba | 200ms | 330KB/sec | Single Disk | $549 | $589 |
| Toshiba | 200ms | 330KB/sec | Battery Powered | N/A | $729 |
| Pioneer* | 380ms | 150KB/sec | 6 Disk Changer | N/A | $899 |
| Pioneer | 270ms | 612KB/sec | 6 Disk Changer | N/A | $1299 |

| CD's (sold only with CD Drive) | Encyclopedia | World Atlas | Us History | Family Doctor | GuinessRecords | Speakers | Caddies |
|---|---|---|---|---|---|---|---|
| | $55 | $22 | $35 | $72 | $45 | $90 | $9 |

## Tape Drives

*Includes: Retrospect Backup Software, 1 Tape, Cables, and a 1 year warranty*

| Capacity | Type | Brand | Speed | Internal | External |
|---|---|---|---|---|---|
| 250Meg | QIC 150 | Archive | 7MB/min | $459 | $499 |
| 2Gig | DAT | Archive | 11MB/min | $1039 | $1079 |
| 2Gig | DAT | Hewlett Packard | 12MB/min | $1259 | $1299 |
| 4-8Gig | DAT | Archive | 88MB/min | $1309 | $1349 |
| 4-8Gig | DAT | HewlettPackard | 42MB/min | $1429 | $1469 |

*We have Hewlett Packard and Archive DAT Autoloaders for large backup.*

| Tapes DC6250 | 6250 5 pack | 90 Meter DAT | DAT 5 pack | DAT Cleaning Tape |
|---|---|---|---|---|
| $29 | $135 | $17 | $75 | $19 |

## Optical Drives

*Includes: SpotOn Formatting Software, 1 Media, and Cables*

| Capacity | Speed | Brand | Feature | Internal | External |
|---|---|---|---|---|---|
| 20Meg | 65ms | Insite | Floptical | $319 | $359 |
| 128Meg | 30ms | Fujitsu | Fastest 128Meg | $1099 | $1139 |
| 650Meg | 53ms | Pioneer | MultiFunction | $2059 | $2099 |
| 650Meg | 27ms | Hewlett Packard | MultiFunction | $2559 | $2599 |
| 1Gig | 35ms | Maxoptix Tahiti IIM | MultiFunction | $2959 | $2999 |

| Media | 20Meg | 20Meg 5 pack | 128Meg | 128Meg 5 pack | 650Meg | 650Meg 5 pack | 1Gig | 1 Gig 5 pack |
|---|---|---|---|---|---|---|---|---|
| | $23 | $95 | $39 | $189 | $96 | $469 | $189 | $929 |

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|---|---|---|---|---|---|
| **FUJITSU** | | | | | |
| 520MB | M2624FA | 3.5 HH | 9 | $899 | $959 |
| 1.1GB | M2694SA | 3.5 HH | 8.5 | $1699 | $1749 |
| 1.2GB | M2266SA | 5.25 FH | 14.5 | $1379 | $1479 |
| 2.0GB | M2652SA | 5.25 FH | 14.5 | $2289 | $2389 |
| 2.4GB | M2654SA | 5.25 FH | 14.5 | $2489 | $2599 |
| • Five year warranty | | | | | |
| **QUANTUM** | | | | | |
| 42MB | ELS42 | 3.5 1" | 19 | $175 | $235 |
| 85MB | ELS85 | 3.5 1" | 17 | $199 | $259 |
| 127MB | ELS127 | 3.5 1" | 17 | $259 | $319 |
| 170MB | ELS170 | 3.5 1" | 17 | $289 | $349 |
| 240MB | LPS240 | 3.5 1" | 10 | $369 | $429 |
| 525MB | LPS525 | 3.5 1" | 10 | $849 | $959 |
| 700MB | PRO700 | 3.5 HH | 10 | $11879 | $1239 |
| 1.0GB | PRO1050 | 3.5 HH | 10 | $1339 | $1399 |
| 1.2GB | PRO1225 | 3.5 HH | 10 | $1499 | $1559 |
| 80MB | Go•Drive | 2.5 | 17 | $299 | $399 |
| 120MB | Go•Drive | 2.5 | 17 | $379 | $479 |
| • ELS, LPS, PRO drives have two year warranty | | | | | |
| • GO•drives have one year warranty | | | | | |
| **SYQUEST** | | | | Single | Dual |
| 44MB | IMS 44MB External | | | $389 | $729 |
| 88MB | IMS 88MB External | | | $489 | $899 |
| 88MB | IMS 88c External | *NEW!* | | $589 | |
| 44MB | SyQuest SQ400 Cartridge | | | $64 | |
| 88MB | SyQuest SQ800 Cartridge | | | $99 | |
| • Drives ship with one cartridge | | | | | |
| • Drives have two year warranty | | | | | |
| **MAXTOR** | | | | | |
| 120MB | 7120 | 3.5 1" | 15 | $239 | $299 |
| 207MB | 7213 | 3.5 1" | 15 | $349 | $409 |
| 330MB | LXT-340 | 3.5 HH | 15 | $599 | $659 |
| 535MB | LXT-535 | 3.5 HH | 12 | $959 | $1019 |
| 540MB | MXT540SL | 3.5 HH | 8.5 | $975 | $1035 |
| 1.2GB | MXT1240S | 3.5 HH | 8.5 | $1599 | $1659 |
| 1.2GB | PO-12S | 5.25 FH | 13 | $1295 | $1395 |
| 1.7GB | P1-17S | 5.25 FH | 13 | $1595 | $1695 |
| • 3.5" drives have one year warranty | | | | | |
| • 5.25" drives have two year warranty | | | | | |
| **SEAGATE** | | | | | |
| 1.2GB | ST11200N | 3.5 HH | 10.5 | $1339 | $1399 |
| 2.1GB | ST42100N | 5.25 FH | 12.9 | $1869 | $1969 |
| 1.6GB | ST41600N | 5.25 FH | 11.5 | $1679 | $1779 |
| 2.4GB | ST42400N | 5.25 FH | 11 | $2499 | $2599 |
| 3.4GB | ST43400N | 5.25 FH | 11 | $3399 | $3499 |
| • Drives have one year warranty | | | | | |
| **MICROPOLIS** | | | | | |
| 660MB | 1624 | 5.25 HH | 14.5 | $1269 | $1395 |
| 1.0GB | 2112 | 3.5 HH | 10 | $1689 | $1749 |
| 2.0GB | 1924 | 5.25 FH | 10 | $2849 | $2949 |
| • Drives have five year warranty | | | | | |

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*for PowerBook 160,180 and Duo computers* $739

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*for Mac Plus, Classic, Classic II, SE, SE/30 & PowerBook computers* $619

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*Half Height* *$85*

- Closed or Open Front Bezel.
- Includes all necessary cabling & "SCSI Specialist" formatting software.
- 110/220 VAC auto switching power supply.
- Full Height cabinet will hold two 3.5" or 5.25" HH drives.

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|---|---|
| PowerBook Cable | |
| HDI-30 ~ 50 Centronics | $39 |
| Power Pad (keypad) | $89 |
| PowerBook Memory | (Call) |
| PowerBook Battery for 140/145/160/170/180 | $65 |
| Battery Charger | $99 |

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*Internal for the PowerBook 2.5" MK224FB-S ...$599*

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| COMstation One | $139 |
| COMstation Two | $239 |
| COMstation Four | $349 |
| COMstation Five | $419 |
| PowerModem I | $139 |
| PowerModem II | $229 |
| PowerModem III | $319 |
| PowerModem IV | $379 |

## TWINCOM

*Modems*

24/96 PowerTwin
Internal 2400/data. 9600/send 4800/receive fax $129

14.4 PowerTwin
internal 14.4 data/fax $299

• Modems ship with software and all necessary cabling.

## DAYSTAR

| *PowerCache* | | w/FPU |
|---|---|---|
| 33MHz | $379 | $469 |
| 40MHz | $549 | $639 |
| 50MHz | $719 | $849 |
| PowerCache Adapter | | $42 |
| *FastCache* | | |
| Turbo 25/128k | | $254 |
| Turbo 33/128k | | $339 |
| Quadra 700/900 | | $254 |
| Quadra 950 | | $382 |
| 25 MHz Turbo 040 | | $1104 |
| 33 MHz Turbo 040 | | $1358 |

• PowerCache & FastCache have 36 month limited warranty.

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*Graphics Tablets*

| | |
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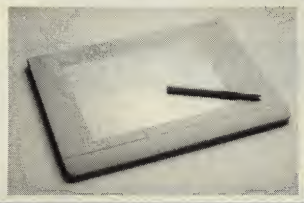
| 6" x 8" w/Pressure Pen | $309 |
| 6" x 9" Standard | $462 |
| 12" x 12" Standard | $660 |
| 12" x 18" Standard | $990 |
| 12" x 18" Electrostatic | $1059 |



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|---|---|---|
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| 128MB | 3.5" | **$40** |

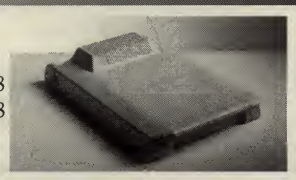
## APPLIED ENGINEERING

| | | | | | |
|---|---|---|---|---|---|
| *Accelerators* | | | | | |
| *for Mac LC, LCIII, Performa 400, & Color Classic* | | | | | |
| TransWarp | 4300 | 40MHz | $369 | w/FPU | $505 |
| *for Mac SE & SE/30* | | | | | |
| TransWarp | 1300 | 25MHz | $185 | | |
| TransWarp | 1300 | 40MHz | $249 | w/FPU | $409 |
| *for Mac Classic* | | | | | |
| TransWarp | 2300 | 25MHz | $185 | | |
| TransWarp | 2300 | 40MHz | $249 | w/FPU | $340 |

## UMAX

*Color Scanners*

| | |
|---|---|
| UC630 | $1078 |
| UC840 | $1248 |
| UC1260 | Call |
| Transparency Adapter | $709 |



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Now your Mac can be a fax and a data modem, too, and with U.S. Robotics reliability built in. U.S. Robotics new Sportster 14,400 Mac&Fax turns your Mac into multi-talented fax machine and Faxstf™ software lets you send faxes to any other fax machine or fax board, anywhere, and print them out on a laser printer. Mac&Fax Sportster: 14,400 CCITT V.32 bis with V.42 bis– 14,400 bps throughput, compatible with 300, 1200, 2400, and 9600 bps CCITT standards, 9,600 bps send and receive Group III Fax, V.42/MNP 2-4 error control and V.42 bis/MNP 5 data compression.

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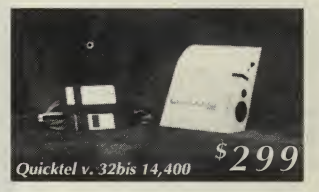
*All SupraFAX modems include STF and MicroPhone software, cable and have a 5-year Warranty*

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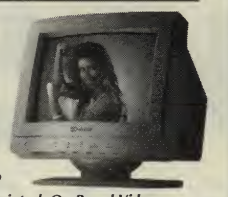
Complete 8-Bit Package - $499



*Compatible with Macintosh On-Board Video: LC, LCII, si, ci and Quadra 900/950*

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256 colors (8-bits) at maximum resolution (1,152 x 882), 4 display resolutions, accelerated.
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**Radius RocketShare ..... 399**
**Radius SCSI-2 Booster ..... 249**

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**2, 4, 8 Meg. x 8 - 80 ..... 59, 119, 279**
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**16 Meg. - 16M x 8 - 80 (Low) ..... 529**
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**4 Meg. - 4M x 8 - 60 (72pin) ..... 189**
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*All SIMMS have a limited lifetime warranty! Call for latest prices!*

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**Co-Processor - Mac LC ..... 79**
**Co-Processor - Mac Classic II ..... 79**
**IIci Cache Card ..... 169**
**IIsi Cache w/FPU Socket ..... 149**
**IIsi Cache w/FPU Installed ..... 199**
**Classic Accel w/Co-Processor ..... 199**
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*7VS-A Increases processor speed from 25MHz to 30MHz!*

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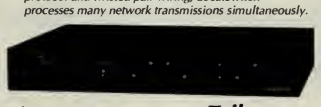
A more sophisticated and larger version of the Asanté 8-port Hub. The most economical way to expand your Ethernet network using unshielded twisted pair (UTP, 10BaseT). Fully supports IEEE specifications..
**AsantéHub 1012 ..... 1,379**
A 12-port, intelligent 10BaseT hub. Built-in expansion slot for internet-working option cards (optional SNMP in-band module). Multiple hubs can be interconnected via BNC, RJ45 and AUI. Works with AsantéView software (optional) for control directly or remotely.
**Asanté Print ..... 349**
An inexpensive Ethernet-to-LocalTalk converter that easily connects one or two LocalTalk peripherials to an Ethernet network. With no switches to set or installation software to load, it is smart enough to work right out of the box. Thick/Thin or Thick/10BaseT.
**TechWorks Ethernet Cards ..... 99**
We made a special purchase of TechWorks Ethernet NuBus cards and are offering them on a first-come-first-served basis. Limited to supply on-hand.

**Tribe LocalSwitch ..... 2,499**
LocalSwitch is a 16-port intelligent packet-switching hub for Macintosh networks. Using standard LocalTalk protocol and twisted pair wiring, LocalSwitch processes many network transmissions simultaneously.



**$2,499** Tribe LocalSwitch

## Keyboard

**$99**

*MAK-105 "Tactile Click" ADB interface compatible extended keyboard for Mac SE and Mac II series, 105 keys layout, 15 built-in function keys, Numeric keypad, T-style cursor pad, 6 cursor-control keys and enlarged Return key ..... 99*

## CoStar

**Stingray Trackball**
**$89**

**Stingray Trackball ..... 89**
*ADB interface with automatic acceleration. Precision-engineered for accuracy and reliability, and ergonomically designed for maximum comfort and ease of use. Sleek, compact design uses less desk space.*

**$439**
**AddressWriter personal envelope and label printer**

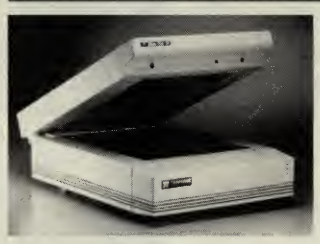
**AddressWriter Printer ..... 439**
144 x 144 impact dot-matrix print head. Optional label feeder will handle a variety of pin-fed labels for added convenience and value. Specify voltage.

**LabelWriter II & LabelWriter II Plus personal label printers**
**$179** CO STAR

***The LabelWriter II and II Plus use direct thermal input technology to produce high-quality labels in a variety of sizes. The LabelWriter can be attached directly to your computer or AppleTalk Network.***

**LabelWriter II Mac ..... 179**
Handles up to 350 labels per roll. Maximum label size: 1-1/8" x 3-1/2". Prints one label in 3-1/2 secs.
**LabelWriter II Plus Mac ..... 249**
Handles up to 700 labels per roll. Maximum label size: 2-1/4" x 4". Prints one label in 3-1/2 to 7 secs.

## 300/600/800/1,200 dpi Color & Grayscale Scanners



*Tamarack 600 dpi Color Scanner $979 and Slide Attachment $549*

**Tamarack 600 Color Scanner:**
**24-Bit Color - 8.5" x 11.5" ..... 979**
**Slide Attachment (shown) ..... 549**
**PhotoShop LE (limited version)* ... 99**
**PhotoShop 2.0 (full version)* ..... 199**

**Relax Color: (Epson Engine)**
**24-Bit Color Scanner - 8.5" x 11.5"**
**300 dpi - 110 VAC ..... 949**
**300 dpi - 220 VAC ..... 1,099**
**Color Studio LE (limited version)* .... 79**
**Color Studio 1.5 (full version)* ..... 159**

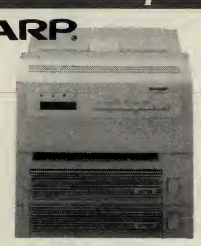
**Umax Color Scanners:**
**UC630** - 8.5" x 14"**
**24-Bit 600 dpi w/PhotoShop ... 1,079**
**Transparency/Slide Attachment . 789**
**Auto Document Feeder ..... 479**
**UC1200S** - 8.5" x 14"**
**24-Bit 1,200 dpi w/PhotoShop 2,999**
**Transparency/Slide Attachment . 889**

**Relisys Color Scanner:**
**ColdScan 800 - 8.5" x 14"**
**24-Bit 800 dpi ..... 1,099**
**PhotoShop LE (limited version)* ..... 99**
**PhotoShop 2.0 (full version)* ..... 199**
** with purchase of scanner, ** includes PhotoShop*

**SHARP® JX-320** **$999**
**16 Million Color - 300/600 dpi**
*An affordable, quality, flatbed 8-1/2" x 11", 24-bit color scanner for business and professional use.*
*Sharp's patented one-pass system ensures quality color while reducing scan times. 600 DPI using Sharp's proprietary software. By strobing three colored fluorescent bulbs through filters the Sharp system ensures optimal color accuracy and eliminates misregistration for clearer reproduction.*
*The Sharp JX-320 is the first color scanner fully compliant with the new SCSI-2 standard which eliminates the need for special drivers .*
*Includes the full version of PhotoShop. OCR compatible. Built-in command set includes: downloadable Gamma Tables; Edge Emphasis; Brightness; and, Lightness. 110 VAC only.*
**Sharp JX-320 Color Scanner ..... 999**
**Transparency Option JX-32F3 ..... 799**

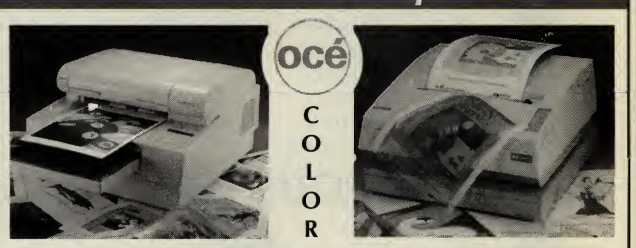
## PostScript Printers Mac & IBM Compatible

SHARP



*600 dpi Engine, 8 ppm, RISC Processor, AppleTalk on-board. Scalable typefaces (PostScript and PCL5) generating thousands of fonts. Printer emulations include Hewlett Packard, IBM ProPrinter & Epson. Parallel and serial interface with automatic sensing. 2 MB RAM (expandable to 8MB).*

**$1,499**




**Four Color PANTONE Matching System • Network Capability**

*The Océ G5241 puts the power of color PostScript® printing on your desktop using a true Adobe® PostScript interpreter. Using the thermal transfer method, the G5241 prints either 3 or 4 color on letter or A3 size, paper or overhead transparencies at 300 dpi.*

**$1,999**

*The Océ G5232 has all the great qualities of the G5241 but increases the printing capability to tabloid size pages at 300 dpi. True PostScript®, 35 Adobe fonts in ROM, downloadable fonts sup-ported. 8Mb Ram, 20Mb hard drive.*

**$2,999**

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Union City, CA. 94587-1291

***We will BEAT any competitor's price for comparable product - call for details!***

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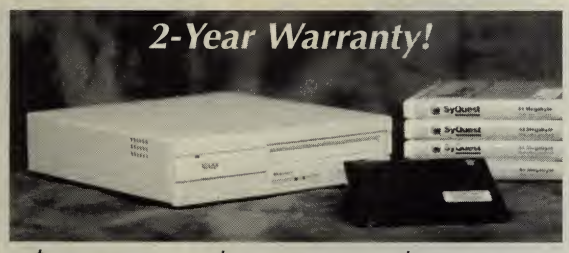
## SyQuest Removable Drives




FEATURING
SyQuest® REMOVABLE TECHNOLOGY

**$389** Mobile 44 SQ555
**$489** Mobile 88 SQ5110
**$589** Mobile 88+ SQ5110C

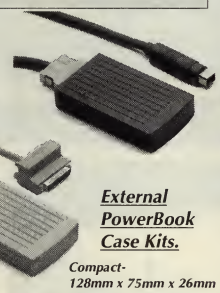
Reads and writes both 44 and 88 Meg. cartridges!

| Cartridge | 1 to 4 | 5 and Up |
|---|---|---|
| 44 Meg. | 63 | 61 |
| 88 Meg. | 98 | 95 |

DIVA VIDEO Shop
Diva Video Shop Plus Megs of QuickTime Movies *FREE* on Every Cartridge !!

### Desktop performance that fits in your pocket!

Our powerful 80MB, 120MB and 160MB FreeLance drives are designed for the Apple PowerBook computers - we even use the same quality drives Apple uses! Light (less than 10 ounces) and fast (17 ms seek time), the FreeLance features quiet and reliable Quantum Go•Drive Series™ drives for added value. Includes everything you need to work with the PowerBook including a ADB port power cable and SCSI cable for the Macintosh.



### Introducing FreeLance™

**FreeLance Drive Packages:**

80 Meg. FreeLance Go•Drive ... 429
120 Meg. FreeLance Go•Drive ... 549
160 Meg. FreeLance Go•Drive ... 679

Includes your choice standard Mac or PowerBook case and a PowerBook or standard Macintosh SCSI Cable.

**Cases and Accessories:**

Adapter - DB25M/HDI30 ..... 29
Gray Case & ADB pwr. cable ..... 70
Platinum Case & ADB pwr.cable .. 70
SCSI Cable - DB25M/DB25M ..... 19
SCSI Cable - DB25M/Cent50M .... 19

**External PowerBook Case Kits.**

Compact- 128mm x 75mm x 26mm Compatible with most 2.5" hard drives- Quantum, Conner, Seagate. Powered by the Apple ADB Bus with included cable or optional AC adapter. Front panel LED operation indicator. External SCSI ID switch.

## DAT, ExaByte & Teac Tape Drives & Tape Media

Tape Drives include media, software and cables!

**Tape Drives:**

160 Meg. Tape Vista - TEAC ..... 449
250 Meg. Tape Vista - Archive ..... 599
600 Meg. Tape Vista - TEAC ..... 699

**DAT & ExaByte Drives Include Retrospect Software!**

**DAT 4 mm Drives:**

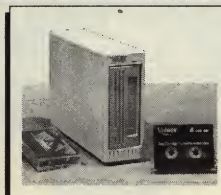
2.0 Gig. DAT Sierra - Archive ..... 1,299
2.0 Gig. DAT Sierra - ExaByte DAT . 1,199
2.0 Gig. DAT - Hewlett Packard ..... 1,399

**Compression DAT 4 mm Drives:**

8.0 Gig. DAT Sierra - Archive ..... 1,399
8.0 Gig. DAT Sierra - ExaByte DAT . 1,499
8.0 Gig. DAT - Hewlett Packard ..... 1,549

**ExaByte Helical Scan 8 mm Drives:**

2.2 Gig. Tape Vista - ExaByte 8200 . 1,799
5.0 Gig. Tape Vista - ExaByte 8500 . 2,839



**2.0 Gig. DAT Tape**
Retrospect software & tape included!
**$1,199**
EXABYTE

**Relax 600 Meg. Tape ..... 699**
Selected for performance, value and service. Quality at low cost. Perfect for backing up hard disks up to 600 megabytes. Complete package includes software, cables and media. MACWORLD - 12/92.
MACWORLD MW EDITORS' CHOICE

### Backup Tapes!

**Teac Tape Media:**

60 Meg Teac CT-600H ..... 25
60 Meg Cassettte-Verbatim ..... 19
160 Meg Teac CT-600N ..... 29
160 Meg Cassette- Verbatim ..... 24
600 Meg Teac CT-600F ..... 39

**Archive Tape Media:**

150 Meg Archive- Verbatim ..... 29
250 Meg Archive- Verbatim ..... 33

**4mm DAT Tape Media:**

1.3 Gig DAT 4 mm 60m ..... 25
2.0 Gig DAT 4mm 90m ..... 35

**8mm DAT Tape Media:**

8mm DAT-Verbatim 106m ..... 19

### Bernoulli Mac 150 $799

Includes cartridge, software and cables.

Iomega has enjoyed an excellent reputation for years as the provider of high quality removable storage for IBM computers. Now they have brought their years of experience to the Macintosh.

• • 150 megabytes of storage in each data cartridge. Includes cartridge, software and cables.

5-year warranty on all data cartridges!

Cartridges - $169

## Premium Hard Disk Drives - Macintosh

### Seagate 3-1/2" Half Height

| | Internal | External |
|---|---|---|
| 240 Meg. - ST3283N, 12 ms. | 439 | 499 |
| 510 Meg. - ST1581N, 14 ms. | 939 | 999 |
| 1.0 Gig. - ST11200N, 14 ms. | 1,369 | 1,429 |
| *5-1/4" Full Height - WREN* | | |
| 1.0 Gig. - ST41200N, 15 ms. | 1,239 | 1,339 |
| 1.4 Gig. - ST41651N, 15 ms. | 1,699 | 1,799 |
| 1.9 Gig. - ST42100N, 12.9 ms. | 1,939 | 2,039 |
| *5-1/4" Full Height - ELITE Ultra-High Performance* | | |
| 1.4 Gig. - ELITE-I, 11.5 ms. | 1,939 | 2,039 |
| 2.1 Gig. - ELITE-II, 11 ms. | 2,799 | 2,899 |
| 3.5 Gig. - ELITE-III, 11 ms. | 3,439 | 3,539 |

### Fujitsu 3-1/2" Half Height

| | | |
|---|---|---|
| 520 Meg. - 2624FA, 9 ms. | 899 | 959 |
| 1.2 Gig. - 2694SA, 8.5 ms. | 1,639 | 1,699 |
| *5-1/4" Full Height* | | |
| 1.2 Gig. - 2266SA, 11.5 ms | 1,399 | 1,499 |
| 2.0 Gig. - 2652SA, 11.5 ms | 2,299 | 2,399 |

### Maxtor 3-1/2" Low Profile/Low Power

| | | |
|---|---|---|
| 120 Meg. - 7120S, 15 ms. | 249 | 309 |
| 213 Meg. - 7213S, 15 ms. | 359 | 419 |
| *5-1/4" Full Height* | | |
| 645 Meg. - XT8760, 16.5 ms. | 1,299 | 1,399 |
| 1.7 Gig. - Panther, 13 ms. | 1,699 | 1,799 |

### Conner 3-1/2" Half Height

| | | |
|---|---|---|
| 42 Meg. - CP-3040, 25 ms. | 179 | 239 |
| 85 Meg. - CP-30080E, 17 ms. | 199 | 259 |
| 120 Meg. - CP30100, 19 ms. | 279 | 339 |
| 170 Meg. - CP-30170E, 17 ms. | 299 | 359 |
| 212 Meg. - CP-30200, 12 ms. | 379 | 439 |
| 545 Meg. - CP-30540, 8.5 ms. | 909 | 969 |

### Hewlett Packard 3-1/2" Half Height

| | | |
|---|---|---|
| 422 Meg. - HP2235, 12.6 ms. | 1,039 | 1,099 |
| 1.2 Gig. - HP2247, 12.6 ms. | 1,539 | 1,599 |
| *5-1/4" Full Height* | | |
| 1.2 Gig. - HP97558, 13.5 ms. | 1,639 | 1,739 |
| 1.6 Gig. - HP97560, 13.5 ms. | 1,999 | 2,099 |

### Quantum 3-1/2" ELS Low Profile

| | Internal | External |
|---|---|---|
| 42 Meg. - ELS42, 19 ms. | 189 | 249 |
| 85 Meg. - ELS85, 17 ms. | 219 | 279 |
| 127 Meg. - ELS127, 17 ms. | 259 | 319 |
| *3-1/2" PDS, PRO & LPS Series* | | |
| 240 Meg. - LPS240, 10 ms. | 419 | 479 |
| 525 meg. - LPS525, 10 ms. | 939 | 999 |
| 1.0 Gig. - PD1050S, 11 ms. | 1,329 | 1,389 |
| 1.2 Gig. - PD1225S, 11 ms. | 1,459 | 1,559 |
| *2-1/2" - Internal for the Mac PowerBook only* | | |
| 80 Meg.- Go•Drive GRS80,17 ms. | 329 | 429 |
| 120 Meg.- GRS120, 17 ms. | 429 | 529 |
| 160 Meg.- GRS160, 17 ms. | 579 | 679 |

Quantum®

*High Performance and exceptional reliability are words commonly used to describe Quantum Hard Drives. The company has maintained a superb record of successes with its line of very fast 3 1/2" half-height and the Go•Drive Series™ for the PowerBook. And now Quantum wants to share its achievements by offering you its proven technology hard drives, two year warranties, and at new low factory prices!*

**Special Purchase**
**Quantum 127 Meg.**
ELS127, 17 ms average access.
**$259**
External Model $319.

## Macintosh CD-ROM Players

**Kodak Multisession Compatible**
**$649**

**Toshiba CD-ROM - XM3401B ..... 649**
Featuring the **Multisession Toshiba XM3401B**. Vista CD-ROM provides state-of-the-art performance including a sealed contamination free environment and an automatic lens cleaning mechanism which dramatically improves reliability. **Fast 200 milliseconds average access.** Full audio control via software is provided by the **Music Box** software. Includes sample CD.

**Texel Multisession CD-ROM ..... 549**
Featuring the **Texel DM3024**. This is a performance drive with 235 ms average access and double the normal speed - 300 KBytes/sec. data transfer. Kodak Photo-CD compatible!

**$299** Portable Player
**NEC**

**CD-ROM - Mesa Portable ..... 299**
**New!** Manufactured for Relax by NEC, the **Mesa** is a fast, portable and fully functional CD-ROM player for music and data. Call for details about this bargain performer.

## Rewritable Optical Drives

**$1,499**
600 Meg. ISO Optical

- Industry Standard - ISO Certified
- Macintosh - IBM Compatible
- Low Cost - High Performance

Large, fast and affordable. We offer a variety of solutions for your large capacity data storage needs.

**600 Meg. Optimem ISO Model 750 . 1,599**
Premium Quality at Low Cost - 60 ms. access.
**While Supplies Last - Limited Quantity!**

**600 Meg. Ricoh ISO 5030E-II ..... 1,499**
Factory reconditioned. Full warranty. 67 ms. access.

**600 Meg. Ricoh ISO 5031E New! ... 2,499**
High performance - 35 ms. average access.

**1.0 Gig. Maxoptix Tahiti-II ..... 3,199**
High capacity - 1 Gigabyte - 35 ms. average access.

**600 Meg. Pioneer MultiFunction ..... 2,199**
Rewritable and WORM in one unit.

**600 Meg. Pioneer WORM ..... 1,799**
Premium quality, best selling WORM

| Media: | 1 to 4 | 5 + |
|---|---|---|
| 600M 5-1/4" Optical Plastic | 99 | 95 |
| 600M 5-1/4" Optical P 5-Pk | 475 | 460 |
| 600M 5-1/4" Optical Glass | 169 | 159 |
| 1.0G Glass, Maxoptix | 239 | 229 |
| 600M Multifunction | 179 | 169 |
| 600M WORM, Pioneer | 109 | 99 |

**128 Meg. Optical**
Macintosh & IBM compatible **$999**

**Each 3-1/2" erasable optical cartridge holds over 120 megabytes of data!** The **Diablo MO** (shown) is an ideal primary or backup storage device for IBM or Macintosh personal computers. Featuring the Panasonic drive, the **Diablo MO** is IBM and SONY compatible - and it is faster! Complete package - includes SCSI cable, On Location software, and power supply.

*Includes media, software & cables!*

128 Meg. Ricoh ISO ..... 1,099
128 Meg. Epson ISO ..... 1,049
128 Meg. Diablo - Panasonic 999

Verbatim®

| Verbatim Media: | 1 to 4 | 5 + |
|---|---|---|
| 128 Meg. 3-1/2" Optical | 44 | 39 |
| 128 Meg. 3-1/2" 5-Pk | 195 | 175 |
| 600 Meg. 5-1/4" Plastic | 109 | 105 |
| 600 Meg. 5-1/4" P 5-Pk | 495 | 475 |

**6-Disc CD-ROM Mini-Changer**
More than 3 Gig of Data On-Line!
PIONEER **$899**

Each compact, easy-loading magazine holds up to 6 different discs. **Additional Mini-Changers can be daisy-chained together to create a CD-ROM library of over 20 Gigabytes of on-line information!** Compatible with SUN, IBM and Macintosh. Can even be used as a CD-Audio jukebox! Full audio control via software is provided by the **Music Box** software (included). Includes SCSI cable, Mac software, and sample CD-ROM. **New - DRM-604X. 4 times the transfer rate - 600K/Sec.**

**DRM-600A 6-Disc .... 899** **DRM-604X 6-Disc . 1,299**

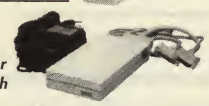
## Case Kits

Cases are Made by Relax In the U.S.A.

**Half Height ..3.5" or 5.25" ..... 89**
**Half Height..with front cut out ..... 89**
Includes 35 watt power supply, prw cable, fan, SCSI ID.
**Full Height..5.25" with front cut out .. 119**
Includes 55 watt power supply, prw cable, fan, SCSI ID.

**Sierra 3.25" ..... 89**
Includes SCSI cable, SCSI ID & Power Supply
For PowerBook or any Macintosh

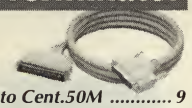
Portable Case Kit for PowerBook or any Macintosh



Includes SCSI cable & power supply
**Pocket 3.25" Low Profile ..... 89**

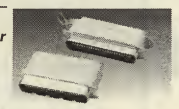
## Cables/Terminator

Hi-Quality Molded SCSI Cables



**2' AppleDB25 to Cent.50M ..... 9**
**2' Cent.50M to Cent.50M ..... 19**
**6' Cent.50M to Cent.50M ..... 29**

TermiGard LED Termination Power Indicators The Best you can buy!



**Standard Single Ended Cent50 ..... 9**
**Active Single Ended Cent50 ..... 29**

Macintosh Video Cables for On-Board Video or Most Monitor Brands

**Mac 15 pin to RGB ..... 39**
**Quadra/Centra 16" or 21" ..... 49**

## SCSI Ulilities

RELAX Formatting Utility supports Hard Drives, Optical Drives, and Removables.
**Mac Utilities v1.25 ..... 19**

Software Architects Formatter One and Formatter Five offer partitioning, AU/X compatibility, Testing, DOS Support and much more.

**Formatter One** ..partitioning,AU/X ..... 49
**Formatter Five** ..Dos Support ..... 159

DK Research offers a wide variety of SCSI Software. Support includes, Hard Drives, Optical Drives, and Tape Drives.

**Hard Drive** ..partitioning, AU/X ..... 39
**Optical Drive** ..partitioning, AU/X ..... 59
**Tape Backup ..... 59**

## PowerBook

CPU software is all the things Apple left out. Manage your PowerBook with these state-of-the-art Utilities. The complete integrated solution!!

Works on all battery powered Macs!
**Connectix PowerBook Utilities .... 59**

Targus carrying cases are known for their quality and good looks. Many models are available.

All Cases are Black with Leather Trim!

**PowerBook ..... 59**
**Mac Classic ..... 69**
**Mac Deluxe SE ..... 79**

## Save!!

**Close-Out Drives**
**Save Up To 50%**

These are one-of-a-kind items at special close-out prices. All include factory warranty.

• 30-day money back guarantee! •
• Limited quantities •
• Subject to prior sale! •

*Hard Disk Drives:*

20 Meg. Seagate ST325N ..... 99
40 Meg. Maxtor 7040S ..... 169
80 Meg. Maxtor 7080S ..... 239
90 Meg. Fujitsu M2612SA ... 239
180 Meg. Fujitsu M2614SA ... 439
210 Meg. Quantum P210S .... 559
300 Meg. WREN ST4350NM . 749
320 Meg. Fujitsu M2622SA ... 769
330 Meg. WREN Runner ..... 999
425 Meg. Seagate ST1481N .. 839
435 Meg. Seagate ST2502NM 839
660 Meg. WREN Runner .... 1,399
1.0 Gig. Maxtor Panther .... 1,699

*Rewritable Optical Drive:*

1.0 Gig. Maxoptix Tahiti-I . 1,999
Factory reconditioned - 1-year warranty

• Prices are for internal hard disk drives models. For an external case add $60.

## Save!! Relax Weekly Specials

*Hard Disk Drives:*

127 Meg. Quantum ELS127 ..... 269

*Monitors:*

Ikegami CT20 20"Color (Monitor Only) Demo ..... 1,399

*Video Packages:*

Radius Direct Color 24
With Radius Quick Color Accel. ..... 699

*Tape Drives:*

60 Meg. TEAC MT-2ST/45S2 ..... 299
2.0 Gig. Wangdat DAT ..... 999

*CD-ROM Drive:*

Pioneer DRM 600A ..... 899

*Scanner:*

Relax Color Scanner
24-Bit (Epson Engine) 110 VAC ..... 949

Relax...you're in good company. Since 1978. 510-471-6112

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DRIVE PRICES GO DOWN.CALL FOR CURRENT PRICES

S.A.G. hard drives with the best price, service and support around. We have been providing hard drives and storage systems to the international computer service industry for years, to the people who replace and upgrade computer systems for major corporations worldwide.

**They demand and depend on expert technical assistance, aggressive pricing and immediate delivery.**

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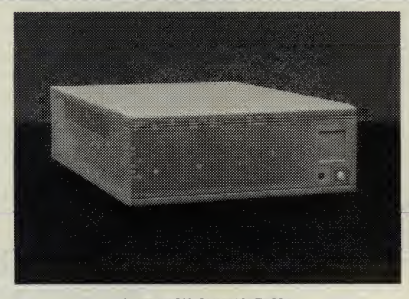
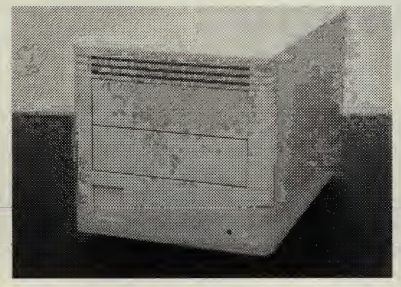
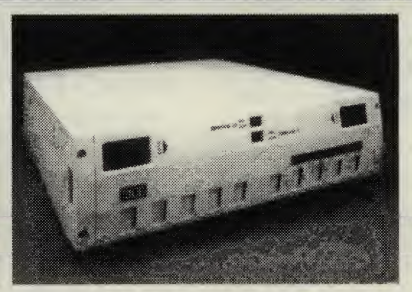
## STORAGE SUBSYSTEMS



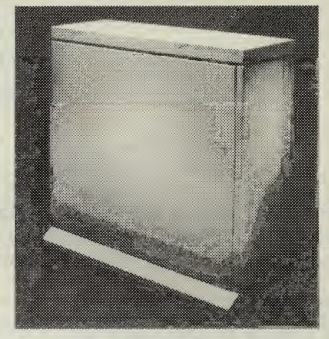
3.5" DISK SUBSYSTEMS



5 1/4" DISK SUBSYSTEMS



REMOVABLE DISK SUBSYSTEMS
2 DRIVES SOLUTION WITH CANISTERS AND SCSI CABLES



TOWER SUBSYSTEMS
8 DRIVES SOLUTION

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ALL DRIVES ARE LISTED WITH FORMATTED CAPACITIES

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| TYPE | MB | SIZE | SEEK | INT. | EXT. |
|---|---|---|---|---|---|
| M2623FA | 425 | 3.5 | 12 | $ 797 | $891 |
| M2624FA | 520 | 3.5 | 12 | $ 770 | $862 |
| M2266S | 1079 | FH | 14 | $1195 | $1312 |
| M2694 | 1080 | 3.5 | 10 | $1489 | $1581 |
| M2652S | 1750 | FH | 11 | $1939 | $2056 |
| M2654S | 2061 | FH | 11 | $2277 | $2395 |

### DEC
5 YEAR WARRANTY

| TYPE | MB | SIZE | SEEK | INT. | EXT |
|---|---|---|---|---|---|
| DSP3085S | 850 | 3.5 | 12 | $1212 | $1307 |
| DSP3105S | 1050 | 3.5 | 12 | $1248 | $1343 |
| DSP3160S | 1660 | 3.5 | 12 | $1782 | $1877 |
| DSP5200S | 2000 | FH | 10 | $1939 | $2056 |
| DSP5350S | 3500 | FH | 10 | $3300 | $3421 |

### CD-ROM CHINON

| | | | |
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| CDS-535 INTERNAL KIT | 650MB | 280MS | $ 450 |

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### SEAGATE
1 YEAR WARRANTY * 5 YEAR WARRANTY

| TYPE | MB | SIZE | SEEK | INT. | EXT. |
|---|---|---|---|---|---|
| ST3283N | 245 | 1" | 12 | $ 368 | $ 462 |
| ST3550N | 456 | 1" | 12 | $ 824 | $ 918 |
| ST3600N | 540 | 1" | 10.5 | $ 859 | $ 953 |
| ST4767N | 665 | FH | 12 | $1228 | $1345 |
| ST1980N | 860 | 3.5 | 9.9 | $1082 | $1175 |
| ST41200N | 1037 | FH | 16 | $1082 | $1199 |
| ST11200N | 1037 | 3.5 | 10.5 | *$1169 | $1250 |
| ST41650N | 1420 | FH | 15 | $1491 | $1608 |
| ST41600N | 1420 | FH | 11.5 | $1755 | $1872 |
| ST42100N | 1900 | FH | 12.9 | *$1725 | $1870 |
| ST42400N | 2100 | FH | 11 | *$2451 | $2568 |
| ST43400N | 2900 | FH | 11 | $3219 | $3334 |

### SPECIALS

| TYPE | MB | SIZE | SEEK | INT. | EXT. |
|---|---|---|---|---|---|
| Fujitsu | 520 | 3.5" | 12 | $ 770 | $ 870 |
| Seagate | 1.04GB | 3.5" | 10 | $1169 | $1250 |
| Fujitsu"Optical" | 128 | 3.5" | 30 | $1020 | $1130 |
| Seagate | 1900 | FH | 12 | $1725 | $1870 |

### MAXTOR
1 YEAR WARRANTY

| TYPE | MB | SIZE | SEEK | INT. | EXT. |
|---|---|---|---|---|---|
| 7213SY | 213 | 1 | 15 | $ 320 | $ 420 |
| LXT340SY | 340 | 3.5 | 13 | $ 570 | $ 670 |
| LXT540SY | 540 | 3.5 | 8.5 | $ 930 | $1050 |
| 1240S | 1240 | 3.5 | 8.5 | $1450 | $1550 |
| P012SH | 1059 | FH | 13 | $1275 | $1399 |
| P017SH | 1345 | FH | 13 | $1557 | $1682 |

### QUANTUM
2 YEAR WARRANTY

| TYPE | MB | SIZE | SEEK | INT. | EXT |
|---|---|---|---|---|---|
| LPS240S | 240 | 1" | 16 | $ 355 | $ 455 |
| LPS525S | 525 | 1" | 10 | $ 895 | $ 995 |
| PD700S | 700 | 1" | 10 | $1155 | $1240 |
| PD1050S | 1050 | 3.5 | 10 | $1324 | $1399 |
| PD122S | 1200 | 3.5 | 10 | $1451 | $1539 |

### CONNER
1 YEAR WARRANTY

| TYPE | MB | SIZE | SEEK | INT. | EXT |
|---|---|---|---|---|---|
| 30170 | 170 | 1" | 17 | $ 260 | $ 360 |
| 30200 | 212 | 1" | 12 | $ 333 | $ 430 |
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| Toshiba External W/sw bundle | $619. |
| Texel External W/sw bundle | $559. |
| NEC External W/sw bundle | $CALL |

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| Micropolis 1.2gb Internal | $1399. |
| Micropolis 560mb Internal | $869. |
| Fujitsu 535mb 9ms Internal | $859. |
| Quantum 240mb10ms Internal | $CALL |
| Conner 212mb 12ms Internal | $368. |

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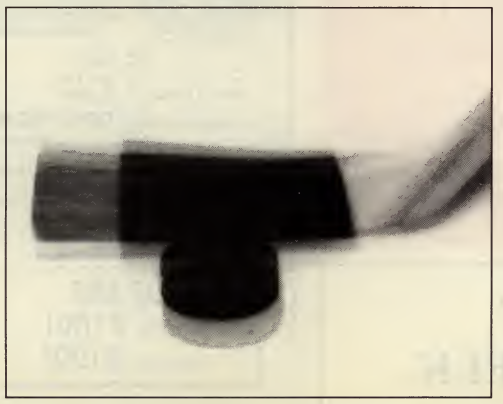

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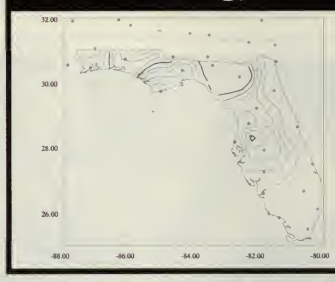

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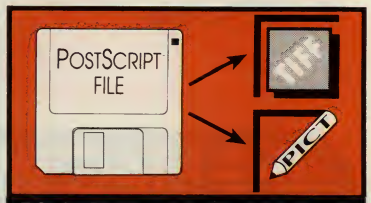


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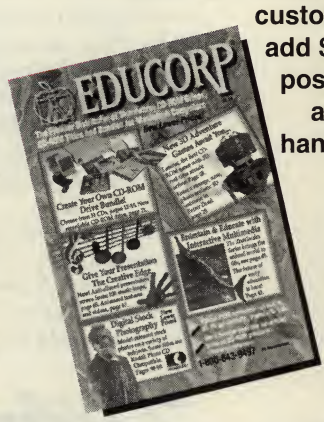


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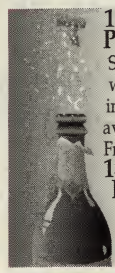

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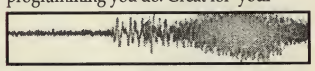

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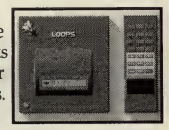

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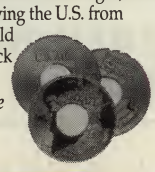

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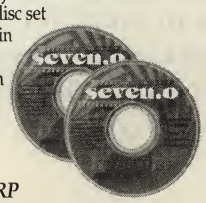


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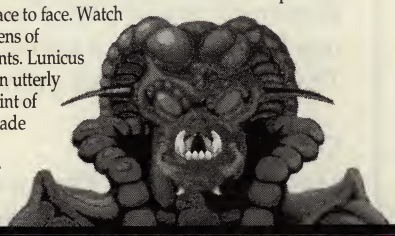

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## Site license

*From Page 1*

customers who purchase volume licenses, provides users with bug fixes, updates, upgrades and technical support for an annual fee. Prices for coverage are based on the particular product and the quantity. Apple is including one year of maintenance coverage with purchases of 500 or more software licenses.

Apple has initially authorized four resellers to sell volume licenses for some or all of the products: MacWarehouse, MacZone, Mac's Place and Comp USA Inc.

The new program is available only to businesses. Apple will continue to directly manage its agreements with educational and governmental sites.

Licensees receive just the right to copy software. Manuals and additional disks are sold separately.

Apple has been slowly briefing selected corporate customers on the program. Cozz Wilson, manager of technical services at TRW Inc. of Cleveland, said he was told of the program by his Apple representative after this month's Apple Enterprise Computing Conference in San Francisco. He said he has not decided whether to participate.

To introduce the program to customers, Apple is offering a discount on System 7.1 volume purchases. Until July 15, sites with 500 to 2,499 users may buy a bulk license for $10,000. After this date, Apple is expected to structure pricing at intervening quantities like the other products in the program.

Apple originally announced its intent to present a site-licensing plan for System 7.1 last October, but the company has been silent on the issue until now, offering only a $449 System 7.1 10-pack.

Some users said they couldn't wait. Scott Furman, manager of information systems at the Atlanta office of the PacTel Cellular division of Pacific Telesis Group, said he decided soon after the release of System 7.1 to standardize his office's 300 Macs on the new version, despite the relatively high cost.

"We felt it was a matter of 'pay me now or pay me later,' " he said. "Despite the fact we feel system software ought to be included with the CPU, we knew we were going to be forced to use [System 7.1] eventually. We worked with Apple and a value-added reseller to come up with our own agreement for licensing."

A piece of the licensing puzzle still missing is a site license for AppleTalk Remote Access, which until last year was bundled with PowerBooks. Sources said Apple is repackaging the product and making minor modifications in preparation for an upcoming introduction as part of the Volume Licensing Program.

The company is reportedly frustrated that less than 20 percent of corporate sites running System 7.0 have moved up to Version 7.1, far fewer than Apple anticipated. □

**Apple site-license prices**

| PRODUCT | 50-99 USERS | 1,500-2,499 USERS |
|---|---|---|
| Apple Font Pack for Macintosh | $4,455 | $99,000 |
| At Ease | $2,655 | $59,000 |
| Macintosh PC Exchange | $3,555 | $79,000 |
| DAL Client for Macintosh | $6,705 | $149,000 |
| MacTCP | $2,655 | $59,000 |
| MacX 1.2 | $10,755 | $239,000 |
| SNA•ps 3270 | $15,525 | $345,000 |
| SNA•ps 3270 GC* | $5,625 | $125,000 |

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**System 7.1 licenses**

| NUMBER OF USERS | PRICE* |
|---|---|
| 50-99 | $2,450 |
| 100-249 | $4,764 |
| 250-499 | $9,801 |
| 500-999 | $10,000 |
| 1,000-1,499 | $10,000 |
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**Pricing effective through July 15.*

# Apple-Microsoft suit winding down

San Francisco — Apple's five-year-old copyright-infringement suit against Microsoft Corp. and Hewlett-Packard Co. appears to be winding down toward a conclusion. U.S. District Judge Vaughn Walker last week scheduled a May 5 hearing on motions for summary judgment and set June 28 for the opening of a trial if one is necessary. The judge also reduced to three the number of individual interface items remaining in dispute. Apple initially claimed that more than 200 items in Microsoft Windows infringed on Apple's intellectual property. □

## Live Picture

*From Page 1*

size images in near real time.

FITS requires users to convert standard TIFF images to a new format called IVUE, which can call up in seconds any section of a high-resolution image. User manipulations of the image are recorded as layers of mathematical functions in a separate FITS file. (This method allows for "infinite undo," Advanced Imaging said.) When an image is finished, the user processes the IVUE and FITS files through a FITS RIP (raster image processor), in a manner similar to rasterizing a PostScript file.

Converting a TIFF file to IVUE format takes two seconds per megabyte, and rasterizing an A4-size high-resolution IVUE file back to TIFF takes five to 15 minutes, Advanced Imaging said.

"FITS has completely changed my thinking about what is possible with Mac graphics," said Kai Krause, vice president of R&D at HSC Software of Santa Monica, Calif. "I'm now thinking that I can put together a two-page, high-resolution spread with 30 images composited in one huge image in three hours."

Advanced Imaging said it hopes to license its FITS technology to a variety of Mac software companies and perhaps even Apple. At Seybold the company gave closed-door demonstrations of the software to a steady stream of executives and programmers from companies such as Adobe Systems Inc., Quark Inc., Fractal Design Corp. and Aldus Corp. HSC said it plans to introduce a new image-editing and special-effects package based on FITS for less than $1,000 in August.

For now, though, FITS is available only in Live Picture. The two French versions due next month can handle 160-Mbyte and 1-Gbyte RGB (red, green, blue) files, respectively. An update scheduled for October will add CMYK (cyan, magenta, yellow, black) editing, color separation, Photoshop plug-in compatibility, and support for Apple's ColorSync and third-party color-management systems.

Live Picture lets users composite multiple high-resolution images to scale at any zoom level, and each composited image can be repositioned at any time. Tools include an airbrush, paintbrush and revisable color palette. Users can also sharpen, blur, dodge and burn, and add spotlights to images.

All Live Picture effects can be applied through masks and stencils. Users can find the edges of objects and automatically generate masks with a brush. Masks can also be created and edited with Bezier drawing tools. The width and density of a mask can be adjusted to make soft transitions between an object and its background without anti-aliasing.

Andreas Pfeiffer, a Paris-based artist, said he used an early version of Live Picture to quickly create high-resolution cover and spread illustrations for SVM Mac, a Paris-based magazine. "I'd brought in over 200 Mbytes of scans and composited 17 images in about two hours," Pfeiffer said. "After playing with the program for a day and a half, I stopped thinking about how I used to wait and struggle to composite with Photoshop. I was only thinking about brushes and moving things around." □

## Seybold

*From Page 1*

Portable Document Format (PDF), its interchange specification, as well as annotate, view, navigate and print them. Acrobat Reader, which lets users view, navigate and print PDF files, will also ship in June, Adobe said. Exchange pricing has not been set. Reader will be licensed to publishers for bundling with their electronic information products; its pricing will depend on volume and use.

Later this year, Adobe said, it will add full-text-search capability to Acrobat. By the first half of 1994, PDF files will be able to contain Standard Generalized Markup Language (SGML) tags, using technology licensed from Avalanche Development Co.

Meanwhile, No Hands Software bragged that it will beat Adobe to the punch: Its Common Ground electronic publishing program will ship for the Mac this week; a Windows version will follow in the summer.

SGML, a standard for encoding document structures and elements, was the focus of many conference sessions and announcements. More than 30 companies banded together to launch SGML Open, a consortium that aims to increase acceptance of the standard and improve interoperability. SGML lets users "have access to and exploit every ounce of value in a chunk of information," said Yuri Rubinsky, acting chairman of the consortium and president of SoftQuad Inc.

Several mainstream companies, in addition to Adobe, discussed plans for SGML products, which for Mac users have been relatively limited. Microsoft Corp. said it is nearing beta-test stage for an SGML filter for Word that, in essence, will let users save Word documents and styles in SGML format. Aldus Corp. said it hopes to handle SGML in PageMaker and Fetch in the future.

SoftQuad, a leading SGML vendor and one of the few with Mac offerings, said it plans a June ship date for a new version of Author/Editor for the Mac.

▸ **Color management.** A conference panel brought out the usual lineup of color vendors, including Apple, Adobe, Kodak Electronic Printing Systems Inc., Electronics for Imaging Inc. and Agfa. After rallying behind Apple's ColorSync concept, each third-party vendor took shots at its limitations, such as incompatibility with CMYK (cyan, magenta, yellow, black) transformations. "The current state of color management is chaotic," said audience member Thad McIlroy, president of The Color Resource, a San Francisco publishing house. "Apple's failure to deliver a more-robust model has left a lot of gaps that the other vendors are trying to plug."

▸ **Type.** In one of the liveliest sessions of the show, font vendors sparred over the ethics of "synthetic fonts" that mimic the style and metrics of existing fonts. Ares Software Corp. executives made attending type vendors cringe when they showed FontChameleon, an upcoming $295 program that can build "billions" of different fonts from one master font outline. Officials from Agfa and Monotype Typography said this program would violate new font copyright laws in Germany and Great Britain, but Ares, which is offering to license it to other companies, countered that it is on "good legal ground" in the United States.

▸ **Screening.** Linotype-Hell Co. and Agfa announced new products, Diamond Screen and CristalRaster, respectively, that take advantage of frequency-modulating, a technique that helps eliminate moirés and other artifacts found in conventional halftone screening.

MegaDot Systems Ltd. announced its MegaDot raster screening method, which will be distributed by Davis Inc. MegaDots are inverted round dots that contain no square edges, enabling lower dot gain on press and higher resolution using lower-frequency screens.

▸ **New color standards.** Leaf Systems Inc. President Robert Caspe proposed High Dynamic Range (HDR), a 48-bit RGB (red, green, blue) color standard for imaging that will provide thousands of gray levels instead of the current 256 offered with 24-bit color.

Another new proposed standard was HiFi Color, a method for specifying colors on press that goes beyond traditional four-color process by using different ink sets and five or more primary colorants. Project leader Mills Davis, who said he has sponsorship from Apple, Eastman Kodak Co., Linotype-Hell, Pantone Inc. and Scitex America Corp., said many pieces are already in place: Presses can currently handle six to eight colors, and new screening technologies are now available. □

## A/UX

*From Page 1*

A/UX 3.0.2 is expected to come bundled with Apple's MacX 1.2 and the new A/UX version of Dantz Development Corp.'s Retrospect Remote 2.0.

While developing PowerOpen for PowerPC-based Macs, Apple will continue to maintain A/UX "to protect end-user investment in 68000 Macs," according to Emilio Robles, public-relations manager for Apple's Enterprise Systems Division. Ron Johnston, Apple manager of systems development with ESD, told AECC attendees that future additions to A/UX could include the porting of Apple's scripting, multimedia and foreign-language capabilities.

▶ **PowerOpen.** Once Apple begins shipping PowerPC-based Macs next year, PowerOpen will be "the preferred Unix solution from Apple," Johnston said last week. The system, based on the Open Software Foundation's OSF/1 kernel, will run applications written for 680x0 Macs in emulation, as well as existing software written for IBM's AIX and new PowerPC Mac and Unix applications in the new processor's native mode.

At the AECC Johnston said Apple will offer three PowerOpen/PowerPC packages. A desktop version, he said, will run on machines with as little as 8 Mbytes of RAM and 80 Mbytes of disk space — far less than most Unix implementations and Microsoft Windows NT require. A multi-user version will be targeted for vertical applications, such as point-of-sale systems.

The third package will be a developers workstation, which sources said will probably run a new X Window-based development environment intended to replace Apple's Macintosh Programmer's Workshop eventually. Johnston said Apple would make its environment the "most productive" development system on the market, and he hinted that the company will offer tools that make it easy for developers to cross-compile their code to run on other RISC platforms.

The current PowerOpen application binary interface specification does not include support for the Distributed Computing Environment (DCE) and Distributed Management Environment, the emerging OSF standards for shared processing, network management and systems administration in multiplatform environments. But the IBM kernel on which PowerOpen is based does support DCE, and Apple will be able to license software implementing the specification if customer demand warrants, Apple officials said. □

*Stephen Howard contributed to this report.*

## CD-ROM

*From Page 1*

these codes that are slightly less than mail-order prices for the same software.

Apple is reportedly aiming to launch the program in the third quarter, in time for the planned introduction of new low-cost Macs in October. By Christmas, sources said, the company hopes to have several discs available, including a games collection and packages targeted at the small-business and K-12 markets. Specialized titles targeted at markets such as desktop publishing and advertising are slated for next year.

Sources said Apple is even considering producing a disc of Windows software, if it goes ahead with a plan now under consideration to offer its CD-ROM players for Windows systems.

Apple reportedly plans to treat the program as a full-fledged profit center. The decision to move ahead with it now, sources said, reflects the company's recent success with CD-ROM drive sales. Ian Diery, Apple executive vice president of worldwide sales and marketing, said last month that 45 percent of all Macs with CD-ROM-capable drive bays are selling with such drives installed; Apple expects to sell more than 1 million of the optical drives this year.

Kirk Loevner, vice president of the Apple Developer Group and initiator of the plan, declined to comment on details but said, "We have been shipping demo CDs with the Performa 600 CD and the Centris machines, and we are looking at different ways to expand that. We are trying to help the small developers who don't have access to the reseller and distribution channels."

Some developers, however, questioned how the program would benefit them. Apple reportedly proposes to pay developers, as a rule, only 20 percent of suggested retail price for each program sold, although other terms may be negotiated in special cases. Developers would have to provide normal support for users purchasing their programs from the discs; in exchange, they would get a list of buyers from Apple and the opportunity to sell upgrades, hard-copy manuals and other products.

The discs will include electronic documentation in Apple's DocViewer format. In addition, developers will be encouraged to submit "infomercials" in QuickTime format.

The initiative, which Loevner in the past has described as providing "virtual shelf space," could stir up new conflicts between Apple and hardware and software resellers, sources said. Mail-order suppliers are reportedly disturbed at the prospect of having to compete with the low-ball pricing Apple plans. Apple dealers, already facing shrinking hardware margins, could have a harder time selling applications to Mac buyers; one dealer said he would probably start offering third-party CD-ROM drives instead of Apple's to keep customers from getting the discs. □

*Stephen Howard and Lisa Picarille contributed to this report.*


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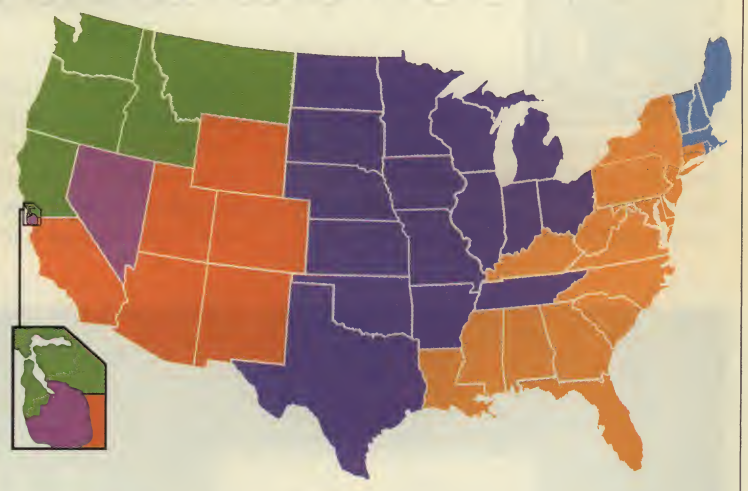

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# 500 channels and nothin' on?

Having to pay tribute to Caesar right on the heels of major holidays for two of the nation's mainstream religions last week was a stretch, but at least it presented the rare opportunity for calm reflection. The contrast between matters spiritual and matters temporal could hardly have been more poignant.

Of course, there's nothing like a good dose of cable television to lessen the impact of those pesky metaphysical conflicts. And what's cable without Larry King, the talk-show host America inexplicably tolerates? You never know who will show up in the guest seat (unless there's an election on, in which case there's a 50-50 chance it'll be Ross Perot). Already this month we've had Barry Diller, late of the Fox television network and currently chairman of QVC, which is one of the leaders in the multimedia-cable-access game. Among the many bits of wit and wisdom he dispensed at the skillful and persistent prodding of King was some information about the state of the development of 500-channel television.

Although many right-thinking citizens blanch at the mere mention of more TV channels, there are those who are convinced that it's better than a day at the beach. In the latter category, perhaps, you might find executives from both Microsoft and Apple. According to Diller, both companies have devices in the prototype stage that are designed to help us cope with the coming plethora of drivel. Specifically, these devices will help the user fine-tune the pool of available channels to include only those that reflect personal interests. And remember, you heard about it on television first.

**Ain't nobody shoppin' around.** Apple created quite a stir in some channels when it introduced its mail-order direct-sales catalog. The cries of anguish from the traditional channels and the shrieks from the crowd that generally dislikes any and all change were heard throughout the land. Readers in both camps will probably be delighted with the Knife's report that, so far at least, the entire program has been a bust.

Nonperformance this dramatic leaves Apple only two choices: It can abandon the program completely, or it can take drastic action. In the case of the Apple catalog, Apple has apparently opted for the drastic. The Knife's sources report that one fix the company is considering is to offer its entire product line in the catalog. Now there's a plan that'll give the traditional channels something real to squawk about. Those who think that the full list prices are the main reason for the failure of the catalog so far will have more of the same to chew on.

**Tracking the people's PowerBook.** Elsewhere within the confines of the Apple organization, we find those who think it would be just dandy if there were some way to boost sales of the PowerBook at the low end. The tremendous success of last year's PowerBook 100 fire sale showed that there's a market for almost anything at the right price, a fact that readers bring up again and again. What they fail to mention is that Apple made approximately no money blowing out the remaining PowerBook 100 inventory, which is why prices are unlikely to be that low again.

Still, the idea of an aggressively priced incarnation of the current PowerBook 145 or some derivative thereof is awfully attractive. Some at Apple had suggested that a PowerBook Performa would be just the ticket, but the Knife's sources claim the portable Performa idea has been abandoned. Perhaps there's a special place in that new, improved second-generation Apple catalog for the right PowerBook at the right price. □

*You can wait until the fire burns out in hell, and you still won't find the MacWEEK mug at your local Price Club. For that, you have to work with the Knife at (415) 243-3544, fax (415) 243-3650, MCI (MactheKnife), Internet (mac_the_knife@macweek.ziff.com), AppleLink (MacWEEK) or CompuServe/ZiffNet/Mac.*

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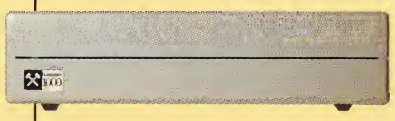

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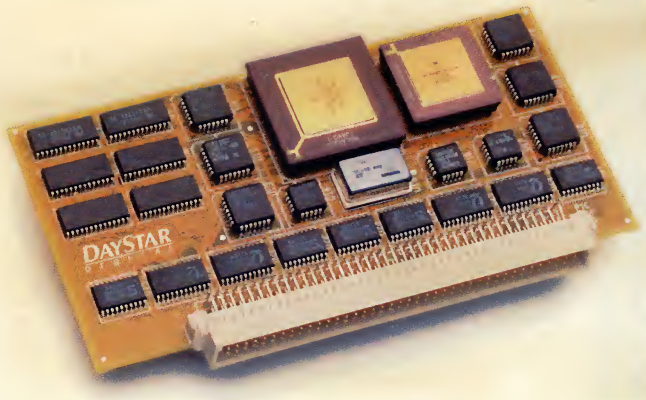


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